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AUTOMOBILE MAKERS AND CLUB TESTS

There is sufficient diversity of opinion among manufacturers of automobiles on the question of the promotion of road tests by automobile clubs to warrant the assertion that, for a long time, these tests will receive support in spite of the opinions of many good men in the industry that they ought not to be encouraged. This fact has been brought out by a number of letters from manufacturers to this paper.

Some time ago it was reported that the manufacturers' association had taken the matter in hand and contemplated the issuance of a resolution to the effect that members should refrain from participating in any events of the kind. It is said that such a resolution was submitted to the members and that the opinions expressed were such that it was not considered wise by the executive committee to take any action in the matter. But it is also said that the question is sleeping, not dead, and that, sooner or later, it will be revived and again laid before the members.

This paper recently invited a number of makers to express their opinions on the subject so that others might know the trend of opinion and so govern their actions. In any and every trade movement some members of the trade hesitate to express decided opinions until they know something of those of the more strong-minded. They are aware that by argument and debate only can all the points for and against be made known. Motor Age has pleasure, therefore, in presenting the opinions of a number of prominent makers on a subject of considerable importance. It is hardly necessary to say, perhaps, that the members of the executive committee and others who have taken part in the discussion in an official capacity have not been asked to express an opinion for publication.

James S. Holmes, general manager of the Remington Automobile and Motor Co., Utica, N. Y.: Inasmuch as so-called

road or endurance tests undoubtedly promote enthusiasm among the public, more or less favorable to the automobile industry, we are in favor of encouragement of such road tests, but believe that competitors should be restricted to owners of vehicles, exclusive of manufacturers. If manufacturers are permitted to compete it is a very easy matter for them to produce special vehicles to accomplish whatever special work is required of them, which specially constructed vehicles might not be wholly salable, and thus such a test would be misleading in the extreme. We are opposed to any form of road tests which, in any manner, violate existing laws or ordinances regulating speed of vehicles. We shall always be glad to encourage customers to enter any form of endurance tests while we, as manufacturers, shall refrain from making such entry on our own account, either directly or indirectly. In order to bring Remington Standard automobiles to their present state, it has been necessary for us to thoroughly test them for both short and long distances over all kinds of roads and any test of a similar nature would prove an educator to the operator, to the manufacturer, and to the possible customer, provided the vehicles entering were from the regular stock, and not specially built for the purpose.

A Buffalo manufacturer: We prefer not to engage in a public discussion of the matter. We might say, without the use of our name, that we believe that anything which calls the attention of the public to the capabilities of the machines will be good for the industry.

John Brisben Walker, president of the Mobile Co. of America, Tarrytown-on-the-Hudson, N. Y.: The manufacturers of automobiles are engaged with so many complicated problems that it seems to me unwise that the time and attention required for more important matters should

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be given to road contests which mean practically nothing. The reputation of a machine is made by the number of them in use and that satisfaction which they give to purchasers, not by single exhibitions into which the factors of personal management and chance so largely enter.

John L. French, president of the St. Louis Motor Carriage Co.: We feel that there is necessity for some limit being put on road tests, otherwise the matter would be very greatly overdone, as was the case with the automobile shows last season. It is of course impossible for a manufacturer to stand the expense, or spare the time, to properly take in all of such numerous exhibitions. Making a machine, however, that we are perfectly willing to submit to any test, knowing that it will stand up satisfactorily, we can not help but favor a certain number of properly conducted endurance tests, as we feel that they will bring out a great deal of information not otherwise made public. If these are properly conducted, we cannot help but feel that they are beneficial to the industry. As before stated, we are in favor of them for the reason that we know our carriages will acquit themselves creditably under any and all circumstances.

A manufacturer of steam vehicles: We doubt whether any real value can ever be obtained from such trials. Usually the machines, under such circumstances, are run in charge of mechanical experts and are built for the occasion and a test of this character would not apply to a standard or regular vehicle sold to and operated in the usual manner by the ordinary buyer. We prefer not to have our names used.

W. D. Gash, manager of the Waltham Mfg. Co., Waltham, Mass.: We are heartily in favor of endurance tests of any and all kinds, and shall always enter our vehicles whenever we have an opportunity. It is easy to print literature with glittering generalities in regard to the efficiency of the automobile, but it is quite another matter to manufacture one

that will actually climb steep hills or make good time under difficulties, and we have so much confidence in what our product will do that, we always welcome trials of this kind. If the manufacturers' goods are able to give a good account of themselves we believe that the expenditure is well invested. If on the other hand they do not acquit themselves with credit it will of course be considered by them an unwarranted expense. We believe also that in addition to the benefits which the manufacturer showing the most efficient automobile receives, such tests do great good to the industry at large, both in interesting the public and in encouraging manufacturers to improve the vehicles.

James B. Baynes, president of the Buffalo Spring & Gear Co.: No matter what the National Association of Automobile Manufacturers may determine to do, many machines made by members will participate in road races and endurance tests; and the manufacturers will naturally take an interest in these machines. It occurs to us that a vote on the subject and a decision arrived at on the lines of the country chairman of a primary election would apply.

"All those in favor of Jones as a candidate, will hold up their right hands—26.

"All those who favor Brown, will hold up their right hands—22.

"I find the total number of votes cast is 48, and the decision of the meeting is that those who want to vote for Jones will do so; and on the other side, those who want to vote for Brown will do so."

E. P. Wells, president of the Steamobile Co. of America, Keene, N. H.: The matter of participation by manufacturers in tests promoted by automobile clubs is, it seems to the writer, one to be determined by each individual manufacturer. The opportunity to "try out" a comparatively new machine in competition with other makes might appeal to the manufacturer who was seeking knowledge as to the value of his own make. Another manufacturer might be tempted to participate for the purpose of bringing his product

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into notice or notoriety. On the other hand the manufacturer who believes that his machine is as good as made and as efficient as any, and who has a demand for his entire product, might very properly feel that he was not warranted in incurring the expense and taking the risk involved in all such tests. I do not see how this matter can be determined by any hard and fast rule, do you?

Stanton Mfg. Co., Waltham, Mass.: The tests promoted by automobile clubs, while in themselves amusing and perhaps instructive to the participants, should not, in our opinion, be taken as a basis of comparison of the relative merits of the different motor carriages ridden. It is one thing for an expert in steam, gasoline or electricity to take a carriage, all prepared for the work, and exhibit its good qualities. It is another thing for the rider who is not a mechanic and with no considerable previous training, to take his carriage and attempt to submit it to the same tests as the expert.

In our opinion, the carriage demanded by the general public to-day is that which can be most easily ridden, handled, and, if necessary, repaired by the owner whose use of the carriage is incidental and not a regular business. The fact that his motor carriage is capable of a speed of a mile a minute, or is able to ascend hills and artificial heights against which we can possibly run once or twice in a lifetime, is of little moment compared with the assurance that he has a carriage that will carry him along the street comfortably, speedily and safely, and that he may, should the occasion require, very easily repair without the aid of an expert who may, at the time when he is most needed, be dozens of miles away.

We look on motor carriage riding much as, in the past, we have looked upon bicycle riding. The man who makes a business of exhibiting either a motor carriage or a bicycle can take either of these machines of only ordinary good construction and can make it do infinitely better work than can a novice with the very best machine possible in mechanical construction.

This in brief is our view of the subject suggested, and while we may not agree

with all of your readers, we think that the great majority of them will conclude that we are taking the right view of it.

E. B. Gallaher, M. E., vice president and general manager of the Searchmont Motor Co., Philadelphia: So far as the Searchmont Motor Co. is concerned we are perfectly willing to go into any fair competition which is promoted by a reliable club, because we can appreciate the value of them, but if this is carried too far it is apt to become a burden to manufacturers. We recall a great many automobile shows which occurred last winter, and the result was the uniting of all the automobile manufacturers to protect themselves. In this city we had two automobile shows within one week, and the same condition existed in New York. The cost of all these competitions and tests is considerable. While we are willing to demonstrate our wagon, and allow it to come in competition with other vehicles, yet, if these competitions become numerous, we can see trouble ahead.

In a great many competitions, manufacturers have entered wagons built for racing, and have run them in competition with lighter-powered vehicles, built for the regular market. Under these conditions the competition is not fair. No mention is made in the report of the runs as to the power of the various vehicles entered. We would suggest, therefore, that there should be some handicap system, based upon the power and capacity of the vehicles, which should be determined, not by the rating of the makers but by a competent committee of experts appointed by the club. The manufacturers would then have no object in building special machines and the regular commercial vehicles that are sold every day would be tested.

We know of makers who have entered wagons on these runs, and have afterwards advertised that they had won a blue ribbon on their standard wagon, but who have refused to sell the particular wagon which won the ribbon, for even 50 per cent above the regular price, stating privately that it was a special wagon.

Anybody can build a special wagon for

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special conditions, but it is a different matter to manufacture stock vehicles in large quantities that will run satisfactorily in these competitions. All the information that both the manufacturer and the owner are after really is the power, capacity and general handling of the every-day commercial wagon.

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Baldwin Automobile Mfg. Co., Connellsville, Pa.: We hardly know what to say on this subject as we have not been able to put our machine in any of these trials, and have no one connected with us that knows much about it. We will, however, say that if any of the people interested in automobiles would pay us a visit and see our machines in operation around this country, than which we do not think there is any rougher, we can fully demonstrate that our machine can stand almost anything. We will, therefore, have to abide by the decision of others.

■
Knox Automobile Co., Springfield, Mass.: We consider tests promoted by automobile clubs to be of some benefit to manufacturers when properly conducted. We should not advocate having them too frequently, but an occasional test that is managed for the benefit of the manufacturers rather than for the benefit of clubs is desirable. Anything that brings the advantages of automobiles before the public must necessarily be some advantage to manufacturers.

■
Duryea Power Co., Reading, Pa.—So far as we can now see the crying demand is for more vehicles and not for more advertising, so we are not interested in tests, particularly if they are at much distance from us, because of the expense attached. On the other hand, we are pleased to show our goods in competition when opportunity offers and would probably enter a local test if the occasion were presented.

We believe, however, that the best tests are the every day ones, for we know that much better results can be obtained from a machine if put under training just as from a race horse under similar conditions and on this account, given two machines otherwise equal, the one which receives the most thorough tuning up may

be expected to show the best results. This being true, tests by manufacturers do not prove, with certainty, the quality of the goods, but may rather be an expression of the expenditure of the maker in getting the machine ready for the test.

The motor vehicle is so complicated that special work done on it is not readily observable and on this account two machines, apparently alike and taken from stock, may be made to give different results. The thing the public wishes to know is: "What will the regular machines do?" and they are finding this out as fast as the machines can be delivered.

We particularly do not favor speed tests, for while it may be argued that speed is the most efficient way of advertising, it is true that vehicles, as at present constructed, have already more speed than needed, on which account speed tests should be avoided and speed kept in the background. Ability, durability, ease of control and comfort are much more important points to-day; while tests, particularly if conducted by manufacturers, show up ability only. They may be supposed to indicate durability, but it is well known that a vehicle may come through a test in apparent good order only to be a fit subject for rebuilding.

Some form of exhibition like a park or country club, where all kinds of roads, including mud, sand and hills may be had and where intending purchasers may go from machine to machine, trying each separately, would seem to us the most sensible automobile gathering possible to devise.

■
Century Motor Vehicle Co., Syracuse, N. Y.—We hear much in these days, from a certain class of writers and speakers, of the "point of view," and the answer to this question would seem to depend largely upon the view point.

Such tests have a certain value for advertising purposes and furnish opportunity for meeting pleasant people and some enjoyable outings.

From the view point of the practical manufacturer, however, the question of expense seems to us to largely overbalance the contingent benefits. The expense to the manufacturers is large and the question of economy may not always re-

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ceive the consideration it deserves from the promoters of the contest. Such expense must be added to the overhead expense when the manufacturer figures the cost of his vehicles and if he sells at a profit there must be a corresponding addition to the selling price. The tests are often, if not in most cases, made with specially prepared machines and for that reason are not as valuable a guide to the manufacturer as the tests which he conducts himself in private at much less expense. The fact that a manufacturer refuses to participate in such meetings cannot be taken as an indication of any want of faith in his product but is more likely a prudent regard for the necessity of keeping down expenses.

Elmore Mfg. Co., Clyde, O.—We do not know how other manufacturers feel regarding the participating in promoted automobile tests in various clubs throughout the country, but, so far as we are concerned, we cannot see wherein any benefit would lie in such tests, as they would all be made by experts. We think it would be more beneficial to the owners of our vehicles to come to our factory

for a few days, learn the manipulation of our carriages, and thus enable themselves to more satisfactorily handle them, even if all this were done at our expense, than for us to waste the time and the services to attend some club test. So far as the gasoline automobile makers are concerned, we think they are all taxed to their utmost to fill orders. We are, and would not for a moment, this season, at least, consider a proposition for any tests, as we are always willing to show a visitor what our carriage will do, at our factory and surrounding country.



American Bicycle Co., New York.—Owing to a press of other matters, we have not given this subject extended consideration, up to the present time; but we presume that contests of this character would give the public valuable information concerning the practical side of automobiling, and for that reason we are inclined to look favorably upon contests of this character, when the purpose is so clearly defined and protected, as in the forthcoming contest of the Automobile Club of America.



CONSTRUCTION OF A BICYCLE MOTOR

PART FIVE.

Figure 21 is the ignition mechanism or operating device for producing the necessary make and break contact for the jump spark.

The ignition cam and contact makers are shown in position. The contact makers are attached to a block of hard rubber or vulcanized fibre, and are connected to the outside binding posts or terminals by flat copper connectors as shown. The binding posts are attached to the sides of the rear portion or back of the case by means of button head machine screws, which pass through the insulating bushings, which go in the lugs on the back or rear portion of the case as shown in Fig. 19. Two contact makers are used which, by means of the cam, Fig. 18, complete the electrical circuit through the battery and induction coil, and are entirely insulated from the motor, so that there is no chance for a ground or to make wrong connections with this method of construction, features which are not found in the ordinary methods.

Figure 22 gives a front view of the insulating block with contact makers at-

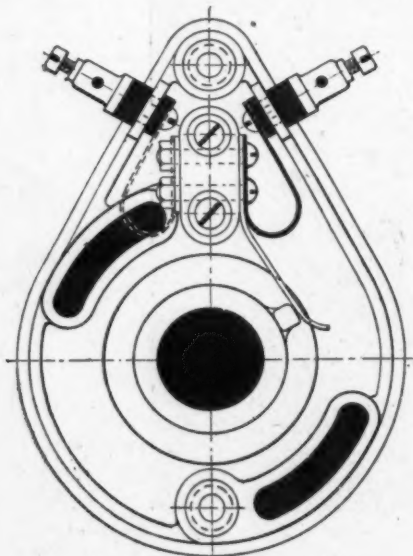


FIG. 21. IGNITION MECHANISM.
Assembled, with cover removed.

tached in place, and also a side view with the rear portion or back of the ignition case shown in section, showing the manner of attaching the contact makers and insulating block in position. The contact makers, of which there are two, as shown, should be of No. 18 B. & S. gauge spring steel. They are each fastened to the insulating block by means of two No. 6-32 button head brass machine screws, with a small double brass washer behind the nuts. The shape and dimensions for the contact makers are clearly shown in this view, so that no other details or further explanations are given. The insulating block is fastened to the back of the ignition case by means of two No. 10-32 phillister head steel machine screws, $1\frac{1}{4}$ inches long.

Figure 23 shows the studs for holding on the removable cover, Fig. 20. These are made from 7-16 inch round steel and should have flats cut as shown, on the 7-16 portion of the studs, for the purpose of screwing them firmly into place in the back or rear portion of the ignition case.

Figure 24 gives two views each of the brass thumb nuts for holding on the ignition case cover, and the small double brass washers which go behind the nuts upon the No. 6-32 screws shown in Fig. 22, which hold the contact makers in place upon the insulating block. Small brass washers as shown should be used under the heads of the No. 10-32 phillister head screws, which hold the insulating block in position, on the back or rear portion of the ignition case. The hard rubber or fibre bushings and washers, which are used to insulate the binding posts or terminals, on the back or rear portion of the ignition case, are shown in Fig. 25.

Figure 26 shows the holding down screws, for holding the ignition case onto the cover of the gear box, shown in Fig. 3. These go through the curved slots in the back or rear portion of the ignition case, and screw into the tapped holes in the gear box cover. They are made of 7-16 inch hexagon steel.

After the parts comprising the ignition mechanism are ready to put together, the

CONSTRUCTION OF A BICYCLE MOTOR.

insulating block should be screwed firmly into place on the back or rear portion of the ignition case, by means of the two No. 10-32 phillister head machine screws. The connections between the contact makers and the binding posts or terminals on the outside of the back or rear portion of the ignition case, are made by means of two strips of soft copper, 5-16 of an inch wide, and of suitable length to take the shape as shown in Fig. 21.

After the holes are drilled in the ends of these connectors, they should be wrapped along their middle portion with a narrow strip of sticky tape, such as is used for electrical purposes, so as to prevent any possibility of their coming into contact with the cover or case. When this is done, coat over the tape with a little shellac varnish, and allow them to thoroughly dry before bending to shape and putting into place. One connector goes on the right hand side of the insulating block, as shown in Fig. 21, and should connect with one of the contact makers in the manner shown; the other goes on the left hand side of the insulating block and is similarly connected to the other contact maker. Only one connector is attached under the heads of the screws, and the other under the nuts, so as to bring one on each side to their respective binding posts.

One of the studs shown in Fig. 23 has

an extension at the rear end which has the 5-16-18 thread. This projects through the back of the rear portion of the ignition case, and this stud should be used as the upper one, or the one directly above the insulating block.

This projecting end which has a small hole shown in it, and should also be provided with a washer as shown, is to attach the controlling rod and lever to. The eye of the rod goes on over the 7-32 of an inch portion of the stud, and is held in place by means of the washer and a 3-32 of an inch diameter split pin, which goes into the small hole shown.

Figure 27 shows a plan of the wiring for the motor for the electrical connections between the contact maker, battery and induction coil, and also the connection between the secondary winding of the induction coil and the sparking plug. In this method of wiring the motor, it is immaterial which of the primary wires is connected to the battery and contact makers, and the same with the connections of the secondary windings to the sparking plug. One wire of the secondary connects with the insulated part of the sparking plug; the other is grounded to the motor by attaching it to one of the screws in the gear box cover or any other suitable place.

This form of ignition operating mechanism has been found by the writer to

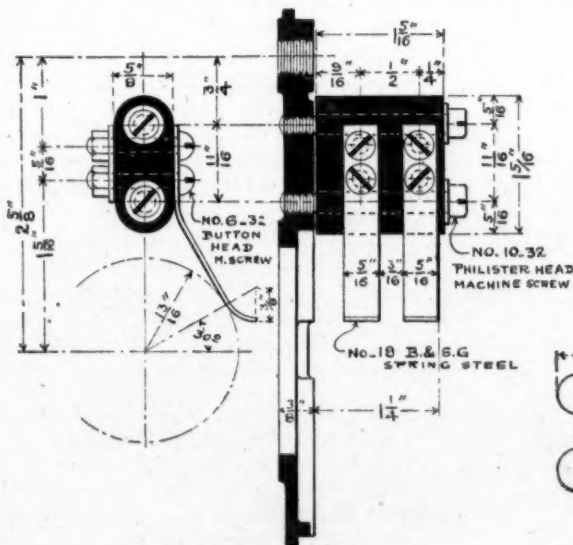


FIG. 22. INSULATING BLOCK.
With contact makers attached.

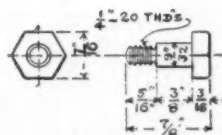


FIG. 26.
HOLDING DOWN
SCREWS.
Two, steel.

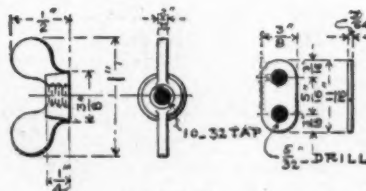


FIG. 24.
THUMB NUTS AND WASHERS.
Two each, brass.

CONSTRUCTION OF A BICYCLE MOTOR.

give very satisfactory results, having been used upon larger sized motors with

makers bright and consequently gives a good electrical contact at all times, and

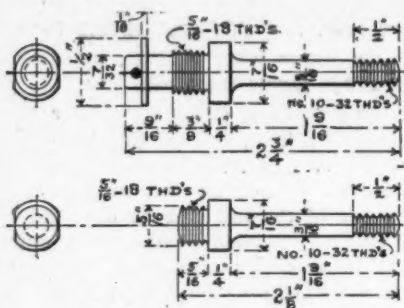


FIG. 23. COVER STUDS.
One each, steel.

excellent results. It is simple in construction, requires little attention beyond occasionally wiping the ends of the con-

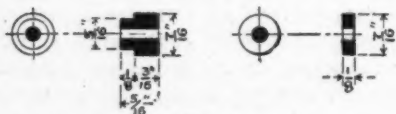


FIG. 25.
INSULATING BRUSHES AND WASHERS.
Two each, hard rubber.

tact makers and the nose of the cam, is not liable to corrode, as the rotary wiping action of the cam keeps the contact

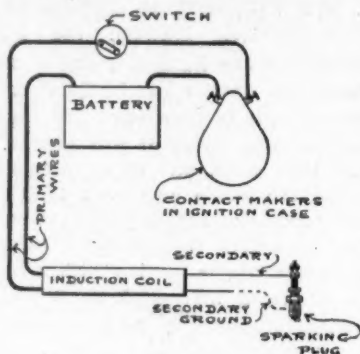


FIG. 27. WIRING DIAGRAM.

rarely needs adjustment after once setting in the right position. This construction also makes it possible to entirely insulate the primary wires from the motor, a point much to be desired, especially in small motors of this type, as it is almost impossible to wrongly connect up the wires if the least amount of judgment is used.

The subject of the next article will be the details of the mixing valve, gasoline tank and muffler.

ALCOHOL TESTS IN FRANCE

The makers of France have been, for a long time attempting to prove the suitability of pure alcohol as a fuel for internal combustion motors and in this their efforts have been ably seconded by the *Auto Velo*, which journal, on July 7, promoted a competition over a distance of 137 kilometers, between Paris and Brainsne, in which the amount of alcohol consumed by each vehicle was carefully measured. There were 11 competitors, of whom 10 finished. The results were as follows:

Cormier, De Dion-Bouton tricycle, 5 litres; Legrand, Gobron-Brillie voiture, 10 litres; Marcellin, light Darraq vehicle, 11 litres 400 centilitres; E. Vilain, light Vilain vehicle, 15 litres 700 centilitres; Gillet-Forest, Gillet-Forest voiture, 17 litres; G. Vilain, Vilain voiture.

19 litres; Wimille, Darracq voiturette, 19 litres 800 centilitres; Gobron, Gobron voiture, 26 litres.

A kilometer race was also run and resulted as follows: Cormier, 1:07 2-5; Os-
mont, 1:07 4-5; Wimille, 1:10; Marcellin,
1:11.

The Auto Velo concludes that the use of alcohol is far more expensive than the use of gasoline. Cormier, on a quadricycle, used only 1 litre 650 centilitres of gasoline over a distance of 70 kilometers. In the Paris-Roubaix, on a quadricycle, he used 7 litres of mixed alcohol in covering a distance of 280 kilometers, or about 1 litre 812 centilitres for 70 kilometers. And now, on a tricycle, he uses 5 litres to go 140 kilometers or 2 litres 500 centilitres for 70 kilometers. The net result seems to be that there is a saving of at least one-third in cost by the use of gasoline.

THE CROWDUS ELECTRIC CARRIAGES

Among the many intelligent contributors to the constitution of the eventual perfect automobile is W. A. Crowdus, who has been at work on the problem ever since the Times-Herald contest on Thanksgiving day, 1895. He obtained his first patent the next year and now the recently incorporated Crowdus Automobile Co., whose place of business is at 541 Wabash avenue, Chicago, operates under 21 of them, all granted to the same person.

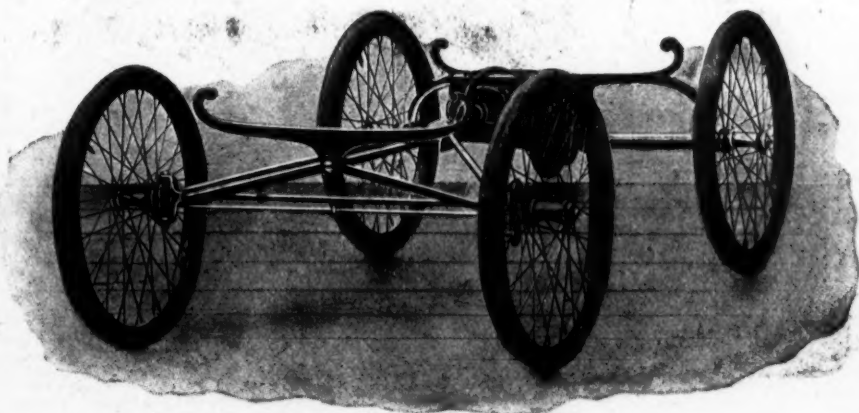
Crowdus has displayed pluck and persistency in the work he has accomplished. Three years ago he had secured patents which brought him a considerable sum for European rights, but instead of holding on to the money he used it to carry on his experiments and to lay the foundation of the business which now seems open to him, for he has interested people with an abundance of capital and the necessary nerve to invest it.

For the last three years Crowdus has devoted his attention to the production of a light, long-distance battery. Having accomplished his object he will now produce carriages which are pleasing in appearance and apparently efficient in action. This year only two styles will be made. They will be runabouts, similar in design, but capable of traveling, ac-

cording to the statement of the designer, 50 and 100 miles respectively. The first is so made that it may easily be changed for the longer distance battery if the buyer desires it.

The carriage is controlled by a single lever. By turning the spade handle five speeds are obtained, varying from three to 20 miles per hour, and the same number are obtainable in the reverse direction. The speeds are indicated on a band around the lower part of this spade handle which is marked Start, Pull, Coast, Slimb, Speed. In addition to an electrical brake, which utilizes the inertia of the carriage to recharge the batteries, there is a powerful double-acting band brake, operated by foot pressure. This mechanical brake acts on the rear wheels, which are keyed to the driving axle through the medium of the differential gear.

The running gear frame on the 100 mile vehicle has been in use since the spring of 1898. It represents an X, pivotally joined at the center so that the axles are allowed a vertical oscillation, while the body and load is directly upon the axles. This is accomplished without the use of a kingbolt. Any blow received by the front wheels is taken directly on the



CROWDUS X FRAME RUNNING GEAR.

CROWDUS ELECTRIC VEHICLES.



THE CROWDUS 100 MILE CARRIAGE.

end of the X brace rods. This side bar frame, made for the 50 mile vehicle only, is the same as the other in regard to the axles, while the side bars are of steel tubing bolted, at either end, to what are properly termed the axle supports, which are of drop forged steel. The motor is suspended by means of a hinge joist to

the rear axle, while its front is joined to the side bars and from the X truss of the frame. The power is transmitted by means of a 45 degree spiral gear, which permits either gear to act as the pinion or driver, and is cased in and runs in graphite grease. In the side bar vehicle the springs are supported on the axles



THE CROWDUS 50 MILE CARRIAGE.

HINTS ABOUT BOILERS.

instead of the bars. Thirty-inch wire wheels are used, equipped with ball bearings, and fitted with tires of any size up to 2½ inches, at the option of the purchaser.

The motor weighs 97 pounds, and under brake test shows 2¼ horsepower at an efficiency of 83 per cent. The vehicle is equipped with dead-beat volt and ammeters, a Thompson recording wattmeter, and an automatic magnetic cut-off. The wattmeter is built to suit the accumulator, and in charging the battery, it runs backwards at a reduced rate of speed sufficient to make up for all losses in the battery. In operation, the point at all times indicates the exact amount of energy remaining in the battery, and when it reaches the point of "full" on charging, the magnetic cutout automatically opens the circuit. Mr. Crowder states that after three years of close observa-

tion in the use of this cutout device, used regularly on a carriage, there has not been a single failure on its part to work.

The batteries for the 50 mile vehicle are contained in four trays of 11 cells each, weighing 8½ pounds per cell, and give off 15 amperes for four hours with an average voltage at discharge of two volts. The battery for the 100 mile rig is made up of four trays containing 10 cells, the weight of each being 12 pounds. When these trays are pushed into position in the bed of the carriage they make their own connections automatically.

The only difference in the bodies of the two vehicles is, that the one intended for the 100 mile vehicle is 3½ inches higher back of the seat. All the meters and the controller are enclosed in the front curve of the box, and are quickly accessible by the removal of the screws.

USEFUL HINTS ABOUT BOILERS

Earl P. Mason contributes to *The Automobile* an article on steam vehicles in which he deals unreservedly with the difficulties and dangers, as well as the advantages of that form of automobile. Of especial interest is his reference to boilers, their construction, use and abuse. Broadly speaking, he says, the steam boiler in inexperienced hands is a source of danger. It is, in fact, a reservoir of stored power constantly straining for release, and its explosion is far more destructive than that of, for example, a compressed air cylinder under even far higher pressure, owing to the fact that the entire body of hot water in the boiler, when released, flashes instantly into steam of some 1,700 times the water's volume.

Very wisely, makers have selected two of the least dangerous types, namely, the water-tube and the vertical multitubular. The former, having no large shell under pressure, is practically non-explosive, since the bursting of an individual tube does not involve the failure of the rest; and in the vertical multitubular boiler the seams are not exposed to the flame, while the lower sheet is so strongly stayed by the tubes that it will ordinarily let go only locally—by burning the ends of the

tubes or by cracking—thus releasing the water gradually and putting out the fire, and not causing what is properly called an explosion.

Nevertheless, since even the lower sheet may be weakened by repeatedly "burning out" the boiler, or, in fact, by numerous other little acts of neglect or abuse, it is of vital importance that the purchaser should master the principles and details of its care before undertaking to operate his machine himself. To avoid "burning out" it is absolutely necessary that the operator watch the water supply as shown by the water glass or gauge cocks, automatic boiler feed devices to the contrary notwithstanding. To be able always to keep this level of water as it should be it is essential that two independent means of supplying water to the boiler should be provided, and both should preferably be run by power and not one of them by hand as is done on many of the makes of automobiles on the market. There should be a pump attached to the engine for ordinary use, and for emergency either an injection or, much better, an appliance such as the writer has on his carriage, a small auxiliary steam pump made expressly for the purpose,

HINTS ABOUT BOILERS.

which can be employed to fill the boiler at all times, whether the engine is running or not, and which will also pump the air to the gasoline tank.

The shell of this type sometimes undergoes internal corrosion, caused by acids in the water, and if this is allowed to advance very far it will weaken the shell. Again, as most makers make their boilers with a steel shell and copper tubes, the boilers are liable to serious corrosive action if there happens to be any salt in the water. Where water with salt in it is used it is well to put a little piece of zinc in the boiler. The electro-chemical action will then be to eat away the zinc, and the steel shell will not be affected. I would strongly advise automobile owners not to use boiler compounds without being positively sure that there is nothing in the compound that will cause corrosive action between the steel shell and the copper tubes.

It is very essential to have at least three gauge cocks, and the operator should accustom himself to using them at frequent intervals, for a water glass is not infallible, as it is liable to stop up at times.

Incrustation of the tubes and lower sheet, by calcareous matter dissolved in the water, is another matter requiring attention. As this "scale" is a very poor conductor of heat, it seriously reduces the

steaming capacity of the boiler, and if thick it may cause burning of the lower tube ends.

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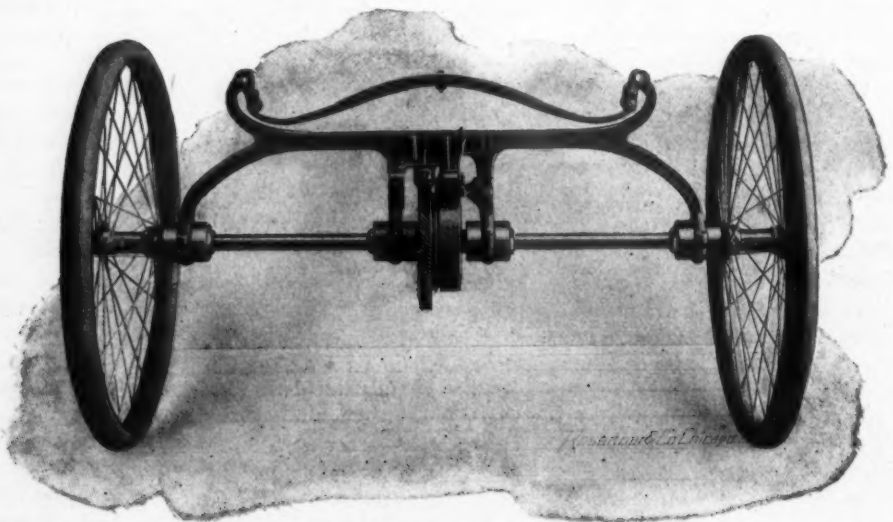
The Panhard Friction Clutch

La France Automobile, a weekly publication of which little is heard in this country, but which contains much interesting information, furnishes a description of the new Panhard friction clutch which, it says, consists of a male cone, having a loose fit on the shaft, which it drives, and capable of sliding on it to engage with a female cone under the action of a spring.

In the friction clutches of this type now in use the male cone is fixed to the shaft, and the whole, both shaft and cone, must be shifted; consequently as soon as the cones commence to engage the shaft begins to rotate. The resulting "moment" is transmitted from the shaft to the sleeve carrying the pinions.

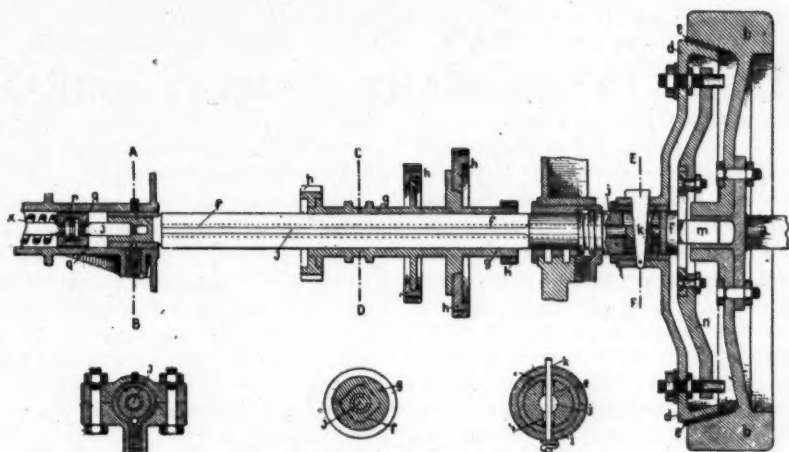
As at this point the lever arms of the "moment" are very short there is a large friction between the shaft and the sleeve which must be overcome in completing the engagement of the cones.

In this new clutch the shaft is not displaced, but instead a central rod fastened to the male cone. The relative displacement of the shaft is secured by means of brackets or driving pins engaging freely into openings at the end of lever arms



THE CROWDUS REAR AXLE.

PANHARD FRICTION CLUTCH.



PANHARD FRICTION CLUTCH.

forming an integral part with the shaft. As these driving pins are near the circumference of the cone the frictional resistance which they may offer to the lateral motion of the cone is slight, and the operation of clutching is therefore effected without difficulty.

The accompanying drawing shows a longitudinal section through the clutch. The smaller views are cross-sections through A B, C D and E F, respectively.

The motor shaft a carries the flywheel b, provided with a cavity c, and forming the female cone. The male cone d, provided with a leather lining e, is mounted loosely on shaft f, which latter, on a square portion, carries a sliding sleeve g, on which are fastened the pinions h.

The cone d is longitudinally movable on shaft f. Its hub i is connected to a rod j within the shaft f by means of a peg k passing through a cut-out of the shaft. The peg k has some lateral play in this opening.

Shaft f is provided at its end with a plate m carrying two arms n drilled near their extremity with holes to receive the driving pins or bolts o fastened to cone d. In this manner the arms n are driven by the cone without hindering the displacement of the latter on the extremity of the shaft f.

When the clutch is to be engaged to connect shafts a and f, the spring x is allowed to act on a slide p moving in a cylindrical opening q and pushing against the head r of rod j. The latter displaces cone d, which enters into the conical cavity c under the pressure of peg k. Cone c then drives cone d, and the latter in turn drives shaft f through the intermediary of bolts o engaged with the arms of lever n fixed on plate m carried by shaft f. This shaft not requiring any longitudinal movement, there is no objectionable friction between it and the pinion sleeve, and a perfect engagement of the clutch is made possible.



DETAILS OF PRIMARY CIRCUIT BREAKER

The great interest manifested by the trade and by many small makers of engines and machinery in gasoline motors such as are now almost universally used on light machines, makes it important that the best of information regarding the vital points in construction of such motors be at their disposal. It is with this idea in view that the following description and illustrations of the primary circuit breaker are given, so that difficulties most commonly arising may be overcome and satisfactory results obtained without the usual long and costly experimenting gone through by people who take up this line of work without being thoroughly conversant with the details.

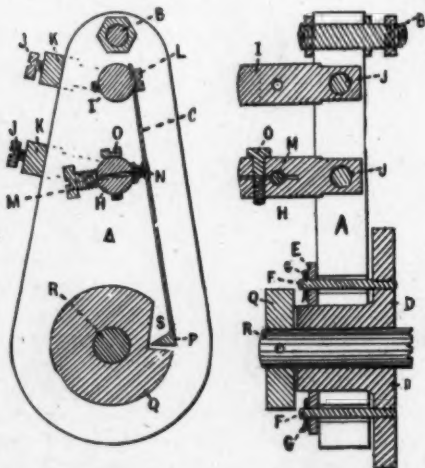
In no feature of the motor are troubles and extremely hard problems so likely to arise as in electric ignition, and it behooves the builder to look well to this part of the mechanism and take advantage of every bit of knowledge within his reach, for it is well known that even the best of those who build this class of machine have troubles, and have learned severe lessons.

It is well to remember that the construction of the mechanism depends

must be entirely insulated from the motor. This form would give two battery, two primary and two secondary wires. The two primary wires must therefore be run to the circuit breaker and be free from any danger of short circuiting with the engine. The secondary wires go, one to the plug and one to ground on the motor, while the other two run to the battery. In this way there is little danger of getting the wires mixed, as they are distinctly named on the coil in order to eliminate danger of being wrongly connected.

This form of coil is preferable for use on a machine where space is no object; where space is limited, the three terminal is more simple. This applies particularly to motor cycles. With this form of coil the make and break apparatus should not be insulated from the motor, as the primary circuit must pass, when the points are in contact, through the mechanism and engine in order to complete the circuit. Upon the break taking place, however, the circuit is broken just the same as in the six-terminal coil, where two primary wires run to the breaking mechanism and are insulated from the motor. This form of coil would have one battery connection, one primary and one secondary. The other battery wire would lead to the engine, termed ground, which would complete the primary circuit when the primary wire was attached to the stud H in the illustration, and the contact points were brought together. The secondary wire would naturally lead to the plug, which would complete the secondary circuit by reason of the grounding of the other secondary, which, in this style of coil, is done on the inside thereof.

The description of these two styles of coil will enable the average mechanic to make his mechanism in such manner that little likelihood of trouble will exist, provided he secures reliable equipment and makes the parts substantially. Cheapness in cost of coils, plugs, etc., should play no part. Good goods cost money and no cheap goods have ever yet



greatly on the coil to be used, or rather on the number of terminals on the coil. Where six are used, the circuit breaker

PRIMARY CIRCUIT BREAKER.

been produced that would accomplish work as satisfactorily as the better grades.

Any good battery will last, some longer than others. Get the best. Some coils will give larger sparks than others, but at a largely increased consumption of battery power; hence choose the coil with care and get one large enough to do the work required, for if it is well made, the larger it is the less battery power it will require and the hotter the spark will be—the essence of successful ignition. Then be sure of your plug. Here, too, trouble is likely to occur. This feature must be gone into with caution, for there are many plugs that are not yet through the experimental stage. Consult a maker with a reputation for good goods.

Perhaps even more responsible for misfiring than the sparking plug is the contact plug or trembler of the high speed motor. This spring is mounted upon a screw held to one of the insulated portions of the commutator. This latter consists of a piece of vulcanite, fiber, or other insulating material, shown at A in the accompanying drawing, and it is usually mounted on a sleeve from the face of the cover of the exhaust cam, which sleeve forms one bearing of the half-speed shaft. The insulating plate or commutator should be held securely so that there is no tendency to side-shake, but it must work sufficiently freely upon the sleeve to allow it to be easily moved backward and forward by means of the rod attached to it at the stud B, and in connection with the timing lever of the machine.

On many motor cycles and also upon light vehicles there is considerable lateral play allowed which greatly interferes with the even action of the trembler C. It would be a great improvement upon many machines if this commutator were mounted upon a bearing capable of accurate lateral adjustment. It has frequently been found that obstinate cases of misfiring have been due to shaky mounting of the commutator upon the sleeve of the exhaust cam cover D, or other part whereon it may be carried in various pattern of motors. As it is usually held in place by a washer E, merely secured to a couple of light

studs F F which pass through slots in the commutator cut at equal radius in order to allow adequate movement, and as the washer is only held in place by the split pins G G, it follows that side-shake may easily occur.

The commutator base is bored to receive the brass studs H and I which pass into it, but not completely through. Into these studs two others, J J, are screwed at right angles, and these pass out at the edge of the plate A. The studs are provided with set screws K K, by which the wires from the primary winding of the induction coil are attached. The stud I has a flat upon it to receive the trembler C, which is secured by a small stud L. The stud H is split longitudinally, and at right angles with this split, and passing through it, is the contact screw M, which can be adjusted so that its platinum point approaches the platinum N on the trembler C. The contact screw is held securely by the set-screw O, which crosses the split in the stud upon it. The trembler C has a thickened end or block P, which takes a bearing on the cam Q mounted on the half-speed shaft R, which keeps the trembler clear of the contact screw M, except for the time in which its loose end drops into the notch S in the cam Q. When in this notch the spring should be free to vibrate against the contact screw M. Upon the accurate adjustment of this spring and screw depend in a great measure the quality of the spark and the even firing of the motor.

The proper adjustment can only be learned by experience, which will best teach the particular tone the spring should give as it is vibrated. The trembler must be firmly held by the screw L, and the metal of the spring, the screw and the stud I must be absolutely free from oil. The same applies to the thread of the contact screw M where it passes through the stud H. The platinum N on the trembler C should be carefully cleaned with fine emery cloth, and, if it be found to have worn uneven, it should be filed true with a fine file, subsequently being smoothed with emery cloth and finally burnished with some blunt instrument. Similar treatment should be applied to the platinum point of the screw M, but in both cases as

PRIMARY CIRCUIT BREAKER.

little of the platinum as possible should be removed, because the metal is costly.

The two faces of the platinum should be perfectly true with each other. When the trembler is securely fixed to the stud I, the cam Q should be turned so that the block P occupies the position shown in the sketch. On no account should this block touch the bottom of the notch in the cam, and if it be found to do so, the spring should be slightly set close to the screw L, in order to bring the block P into proper position. On the other hand, the trembler must be set so that the block falls well into the notch of the cam, which fall will cause the necessary vibrations of the spring.

When the trembler C is in the correct position, the contact screw M must be screwed through the stud H until its point nearly touches the block N on the trembler C. The vibrations of the spring will then make and break the circuit, and the spring can be tested to a certain extent by raising the block P until it is at the same distance from the half-speed shaft that it would be when resting on the periphery of the ignition cam R, and letting it go suddenly, when the spring would vibrate against the screw M and a series of sparks pass between the point of the sparking plug. This latter may be taken out and laid on the motor, care being taken that the end to which the high tension wire is attached is not touching the frame or placed close to it, as, in the event of

also be tested without removing the sparking plug by disconnecting the high-tension wire from the plug and holding the end of the wire about one-quarter of an inch from any part of the motor, being careful to grasp the wire by the insulating cover, and causing the trembler C to vibrate with the finger as described. A flaming and cracking spark will pass between the end of the wire and the motor, if the trembler and

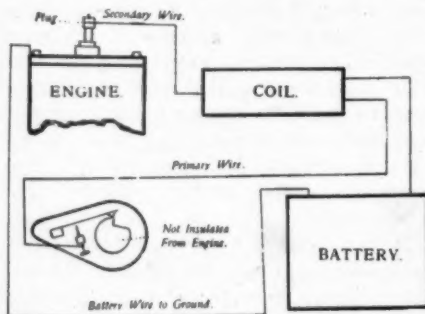


Diagram of Three Terminal Coil Connections.

contact screw be properly adjusted. It is well worth while to devote some considerable time to learning how to effect this apparently simple but really somewhat difficult adjustment, as upon it depends in a great degree the running of the engine. Some motor engineers do not seem to consider that it is necessary for the trembler to vibrate, and think that, provided it makes a contact with the screw M, it is sufficient. Experience, however, is all on the side of such an adjustment as will allow the trembler to really do what its name implies.

No oil should be allowed to reach the commutator, but the merest suspicion on the periphery of the ignition cam R is useful in reducing wear and friction upon the block P of the trembler C. This very minute quantity of lubricant is best applied with the finger and should be very sparingly renewed. The aluminum cover—not shown in the drawing—which fits to the part A should be well secured in place and always used, because it will keep dust from the trembler and contact screw. Dust is nearly as bad as oil for causing short circuiting troubles and misfiring.

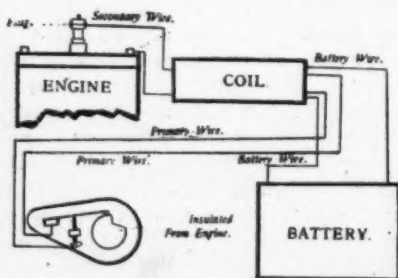


Diagram of Six Terminal Coil Connections.

either of these occurring, short circuiting of the secondary current will result in no sparks being generated.

The adjustment of the spring cam can



FROM CORRESPONDENTS



Westbrook, Me., July 16.—To the Editor:—Regarding a newspaper article which stated that the boiler of my automobile "blew up," will say that the whole thing was the outcome of a too fresh six-dollar-a-week correspondent. It is true that I allowed the water to get low in the boiler, with the usual result, the loosening of some of the tubes. The machine is as near perfect as one can be and I have nothing to offer in the way of improvements. In my case the change should in the writer, but as I am 65 years old, a change for the better, so far as running a motor carriage is concerned, is not likely to occur.—Yours, etc., Thos. J. Foster.



Duryea's Reply to Edge

Reading, Pa., July 20. To the Editor.—In your issue of July 11 you quote some remarks of S. F. Edge, in which he makes the statement that a heavy vehicle is necessary in order to make speed. This same fallacy was talked in the early days of the cycle and proven fallacious and there is no doubt to its being equally fallacious in the motor vehicle field. For a given power a light vehicle is faster than a heavy one provided it is properly proportioned; and the whole thing becomes a matter of proportion. For example, we have driven one of our three-wheelers, weighing less than 700 pounds, single miles faster than 1:35 and a stretch of 23 miles in 42 minutes; the former being nearly 38 miles per hour, the latter nearly 32. By comparing these speeds with Mr. Edge's statement regarding a 2,000 pound car making 40 miles per hour you can readily see that somebody is misinformed.

In our case we could not run faster because we were using regular gearing and

the motor simply could not turn over faster. With a high gearing we can undoubtedly do much faster speed with the same weight of vehicle. We propose to demonstrate this in the near future, using one of our regular motors and regular vehicle, excepting longer wheel base and higher gear. We have demonstrated many times in the past that a motor vehicle should be very light in front which makes it steer easily and push easily and, having all the power on the driving wheels, it will take advantage of all the driving effect instead of causing slip of the driving wheels because of the heavy push necessary to overcome the front end resistance.

Complaints are frequently made about the rear tires of motor vehicles wearing out readily, due to this slip. If these same vehicles were loaded very heavily behind or more lightly in front there would be less slip tending to wear the tires and less danger of skidding.

It seems to take the public a long time to learn that the motor vehicle is an entirely different proposition from the horse vehicle. Carriage makers throughout the country are condemning the long wheel base motor vehicle because a long horse vehicle pulls hard. The difference is as plain as pushing or pulling a wheel barrow. If pulled, a short barrow handles easiest; if pushed the reverse is true as the short one tends to push into the ground instead of over it. Yours, etc., Chas. E. Duryea.



How a Parasol Caused Trouble

Maryville, Mo., July 17.—To the Editor:—All users of steam carriages of the early type have, no doubt, been troubled more or less with back firing; that is the wind blowing down the chimney and

FROM CORRESPONDENTS

shooting a flame out under the carriage owing to improper construction of the chimney.

I had run one of the early carriages about 1,000 miles and had begun to think I was competent to handle any troubles that might occur, when one day I started, in company with a lady, for a 20-mile jaunt with a good head wind blowing. With a wind in a person's face there was no reason why I should expect anything but the best of fires in my furnace, but, starting out with a good air pressure, I discovered before I had gone a mile that my steam was going down rapidly and I slacked my pace to let it work up to good pressure. It did not rise and I got out to discover that the furnace was red hot. I turned out the fire for a minute and let the furnace cool down. After lighting it again, it burned as finely as I ever saw it and I soon had 140 pounds of steam.

I got in and started down a light grade only working a small amount of steam. To my surprise my steam commenced running down and on reaching the bottom of the hill, half a mile long, I again got out to find the furnace red hot. I again turned out the fire and after it had cooled off relighted, and it burned as well as I ever saw it.

After getting up full pressure I started a third time, but with the same result. Steam would go down as rapidly as though fire had blown out. To make a long story short, for seven miles I wrestled with the problem. Why did the fire burn when the carriage was standing and fire back, when running, so that it would heat the furnace red hot in 5 minutes?

I had just about concluded to turn around and go home and take the furnace apart and see if I could find the trouble. I had stopped and was stooping down by the side of the carriage when I felt a gust of wind hit me in the face coming, apparently, straight down. I looked up and discovered the lady holding her parasol over her shoulder in such a way that the top hung just back of the chimney!

It struck me, like a flash, that the trouble was from the umbrella catching the wind and shooting it down the chimney. Of course the motion of the carriage, together with about a 10-mile wind, made

a mighty strong draft, especially as the draft was on the wrong end.

I said: "It's your fool umbrella that's causing all of our trouble; put it down and we will try it on this long grade ahead." After getting up a good pressure we again started and a better fire never burned in my furnace. When I returned home I put on a cross draft chimney. Since then I have had no further troubles with back drafts in head winds.—Yours, etc., W. J. Staples.

♦♦♦

Progress of Motor Cycles

Grand Rapids, Mich., July 22.—To the Editor.—As illustrating the progress of motor cycles of all classes in the short space of a year we call your attention to the fact that, while there was not a motor cycle in Michigan 12 months ago there are now agents, with samples of the Thomas machine delivered, at Detroit, Jackson, Battle Creek, Kalamazoo, Grand Rapids, Holland, Traverse City, Flint, Pontiac, Mackinac Island, St. Clair and several other points. We believe motor cycles are surely coming and cannot be stopped. We had some trouble at the outset, but these vanished as we became better acquainted with the machines. Others will have the same experience.

We also handle the Mobile, the Oldsmobile and the National and have had no trouble with any of them. Yours, etc., Adams & Hart.

♦♦♦

Mail Order Cycles are Costly

Paris, Tex., July 18.—To the Editor:—The writer heard an argument in the repair shop that suggested more or less logic—perhaps more than less. While standing around in the repairer's way, my attention was attracted by two customers, one rolling in a well known Cleveland bicycle; the other a combination inside and outside joint machine, whose head, a short time ago, boasted of a fancy transfer, which had since been rubbed off. As it happened, each of these gentlemen was afflicted the same way, each having broken a right crank, and each claiming any other machine would have broken under the same circumstances.

This being unusual, I began to get in-

FROM CORRESPONDENTS.

terested, and took a more comfortable position on a handy box. Our Cleveland rider, being in front, said: "What will a new crank cost me?" When the repair man said "\$1.00," you should have seen the radiant smiles on two customers' faces! Then our rider of the pedigreeless machine spoke up and said: "What will a crank cost me?" Our repairer hesitated for a moment; rubbed his meditator a little; examined the unknown; said he presumed it was some kind of a two-piece hanger he had never met before; saw the utter hopelessness of duplicating it; deliberately figured up the cost of a whole new hanger system, and said "\$3.50." Thereupon one-half of our customers flew into a rage, and wanted to know why he was charged so much more than the other half.

I began to believe our repairer would get mixed up here, but he seemed to feel at home and began explaining in this manner: "Before putting together a bicycle, makers of standard machines have all the parts carefully inspected and divided into two classes—those that are perfect and those that are not. The good parts are made up into bicycles, upon which the makers are proud to put their names. The other material is thrown into the junk pile, and bought up by assemblers, who make it up into any kind of machines to sell to bargain stores, which label them with a transfer, or some cheap name plate that gives no clue to the maker and then scatter them broadcast over the country by the mail order system. For this reason we cannot tell whence your parts come."

"And verily the one went away rather justified than the other."—Yours, etc., E. K. Baker.

State Law Always Rules

Rochester, July 22. To the Editor.—The New York state legislature, at its last session, passed an automobile speed law, which I believe placed the limit at eight miles within cities. I see that the Rochester common council recently passed a speed limit of six miles and many here are asking which of the laws takes precedence, that of the state or that of the city. The city cannot enforce its law as it conflicts with that of the state. The

automobilists of Rochester would see to it that the city repeals the conflicting law, though it is a dead letter in any event.—Yours, etc., I. A. M. Bartholomay.



Severe Test of a Foster

Piqua, O., July 21.—To the Editor:—Recently I had a spill which resulted in many bruises for myself and a companion, but proved the stability of my machine. The name of the automobile is the Foster. It was not at fault. I endeavored to avoid a frightened horse and struck a sand pile in the shade of some trees. The machine turned completely over and only broke slightly, back of the seat, the dash and one lamp. It also bent the tubing in front. We repaired it here and made a 60-mile run with no trouble. The Foster is built strongly or it would not have stood the jar on the hard paved street.

Steam machines should have throttle valves open same as a locomotive, pull instead of push to open.—Yours, etc., C. R. Reid.



Muzzle the Spiteful Salesman

Buffalo, July 20. To the Editor.—Your article in last week's paper entitled "Late Events which suggest reforms" is pertinent and timely. There is not the least doubt that many sales are lost by salesmen through disparaging remarks in regard to other people's automobiles. The manager of a Main street establishment told me last week, that Buffalo has contracted the "knocking" habit and has it in bad form, to the detriment of the business.

Some time ago the president of a famous Connecticut manufacturing firm remarked that he was becoming interested in the automobile and that he favored the electric. This information appeared in your paper and the result was that quite a number of representatives of automobile manufacturers called on the gentleman. When the last had made his best effort to damage the reputation of his competitors the prospective buyer was in about the same frame of mind as the Chicago man you speak of who resolved to stick to the street cars. He is now wait-

FROM CORRESPONDENTS.

ing until Mr. Edison brings out his new battery as he was given to understand, by the gasoline and steam representatives, that the present type of battery is of no earthly use except for short journeys and that its weight would sink a canal boat.

Some time ago the bicycle trade set its face against the "knocking" habit and in many stores a sign was conspicuously displayed which read: "Please do not ask us anything about our competitors' bicycles; we know nothing of them." The spirit, at least, of that sign, should be followed in the automobile business.—Yours, etc., W. J. M.

Another Alleged Fire Quenched

La Fayette, Ind., July 18.—To the Editor:—The papers have had an exaggerated account of a fire which occurred on my Locomobile. The accident was no fault of the machine. I simply turned out the fire for a moment to go in the house after a hard day's run and stayed a little too long; then turned on the gasoline, which did not generate, causing the flame to spread over the machine and scorch the paint.

I consider the entire machine first class and when operated properly it will do all that the company claims for it.—Yours, etc., Chas. A. Meeker.

Will Someone Please Answer?

Chicago, July 20.—To the Editor:—It has been said that a fool can ask more questions than a wise man can answer. I am afraid you will have to write me down a fool, for I want to know a few things and doubt whether the wise men

of the automobile business can answer them. Here they are:

Why don't the steam wagon makers use larger boilers?

Why don't they put on steam pumps?

Why don't they adopt low water alarms?

Why don't they use larger pipe connections and pipes?

Why do they lead water up to the cross-head pump through a $\frac{1}{4}$ -inch opening, try to make a 9-16 plunger force it through a 1-8-inch opening into the boiler, and expect it to keep the water level up to a safe point?

Why can they not supply a dome on the boilers so that the boilers will not foam over into the cylinders?

What is the necessity of such an extremely large heating surface and such an extremely small quantity of water?

Why don't they provide openings in the water-glass connections large enough to prevent clogging and fooling the driver to the extent of a burned boiler?

Why don't they use heavier frame construction and provide for more free equalizing of the strains caused by passing over uneven surfaces?

What is the necessity of using more than, say, 25 pounds pressure in the gasoline tank?

Why economize so, in dimensions, when the universe affords so much room and when, if a little more were used in building vehicles of this class, their efficiency could be so far enhanced?

Is there any reason why the exhaust cannot be run through a set of condensing pipes instead of passing out in a cloud to call the attention of non-users to this unsightly feature?—Yours, etc., Numb-skull.



FACTS ABOUT BATTERY DEPRECIATION

BY REGINALD P. WALES.

The paramount issue with the gasoline automobilist being the generative agency, it is our intention here to set forth several suggestions with the view of their being given practical adaptation.

The subject is best approached from the standpoint of diagrammatic illustration, since this method best serves to render the reader a more comprehensive understanding of the inequalities constantly confronting him and bringing about new problems in ignition, whose solution is accompanied by no small amount of difficulty and not at all without a fair knowledge of the numerous peculiarities to which a battery is heir.

Being confronted by a condition of considerable complexity, solution is only possible when an adequate understanding of the situation is obtained. This is easily accomplished by associating the series of derangements to certain normal requirements which never vary and so may be taken as a standard, infallible in every instance. There is, then, a basis upon which a logical inference of the existing difficulty may be drawn. Immediate and accurate solution cannot do otherwise than follow when the certain inequalities are all embraced and woven into a chain of indisputable evidence; from such a course

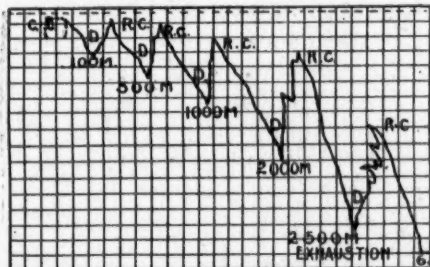


Figure 1.

some feasible explanation must be deducted.

It is not our intention to make this article onerous and tire the reader by an unwarranted or superfluous detail, nor to plunge into the depths of technicalities, which are often both incomprehensive

and confusing. We have only these facts to set forth. The batteries having been charged and proper connections made to form a continuous circuit, immediately there takes place a certain condition which brings about depreciation. As long as the current's path is continuous, this condition goes on with varying rapidity; cessation is only imminent upon exhaus-

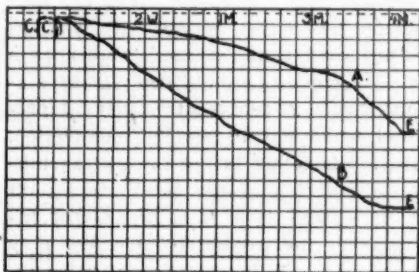


Figure 2.

tion of the fluid's strength. But even though the circuit is not formed by switch connection, deterioration continues irrespective of the closed circuit—the ratio being, of course, considerably less than when energy is being developed by the series.

The reason for this constant depreciation is obvious. Zinc contains other principles than the pure metal which serve only to destroy the efficiency of the one in question. If it were chemically pure, the acid's continual attacks on it would in no way affect it detrimentally. But being embodied as it is with other alien qualities, a very active basis is formed upon which counter electro-motive forces are established and remain in constant activity so long as the metal is intact. It is this phenomenon which gives rise to local action (establishment of counter-forces) and this being the primary action the subsequent one must be disintegration of the zinc. There is a method by which ordinary metal may be made to acquire the properties of a pure medium. It is not absolute in its effect, yet such a treatment checks, very materially, the existing evil and prolongs, without doubt, the life of

BATTERY DEPRECIATION.

the plate. Such a course is called amalgamation and is obtained by following the formula here given. Clean the zinc by thorough washing in a solution of dilute sulphuric acid; rinse in clean water, care being taken not to allow the fingers to come in contact with it. Simply immerse in a vessel of mercury and a uniform coating of the metal will result. The constant replacing of the plate soon becomes quite an item of expense and the motorist will readily appreciate the saving and advantage gained by adopting such a method of preservation.

Deterioration of a cell not in activity suggests itself as being improbable, but when sufficient thought is given the phenomenon of "local action," it will be forcibly seen that nothing embraces a greater range of possibilities. In the diagram, Fig. 2, A represents a cell's depreciation when not in motoric connection. Attention is called to the ratio of shrinkage commencing at the third month. It will be noted there is a wonderful increase over the preceding ones and may be accounted for in this way: The solution at about this period becomes so thoroughly saturated with the minute qualities absorbed from the zinc that its efficiency rapidly becomes impaired. Up to the time of the third month this metal resists, in a measure, the persistent attacks made on its surface by the acid, but constantly growing softer by the unremitting undermining, finally gives way, resulting in the throwing off of infinitesimal particles. These become soluble with the solution and weaken it immensely. This accounts for the increased drop.

Line B clearly exemplifies the relative difference in depreciation when closed in a circuit. No explanation is necessary as the reader will instantly realize the effect activity creates.

Figure 1 illustrates the efficiency of the entire series at certain intervals. The charging crest, represented by C. C., is the highest point of efficiency; R. C. shows crest of recuperation which, it will be observed, never regains, in a mathematical value, the normal standard which is marked by the abscissae of par strength. Let the reader note the depreciation of wave 4, which shows series condition after usage of 2,000 miles. Here the first signs of exhaustion are manifested. In many series this point is reached considerably before the specified time, and, in some instances, after. The numerals herewith set forth are taken from an average. The upward recuperative wave is not constant, that is, it does not ascend with the steady stroke of its predecessor. Instead of being consistent with these, several interruptions mark its upward stroke toward the height of the crest. 5 is merely a repetition of the preceding one, except in an aggravated form. The final crest is reached with more difficulty and all manifestations of exhaustion are imminent, which actually becomes apparent at 6.

This diagrammatic scheme should enable the reader to get a more or less adequate understanding as to his series conditions at certain periods and should afford him such knowledge that some calculation may be readily drawn relative to recharging the deteriorating series.





CYCLE SPORT AND TRADE



It has been Gascoyne's week. He has done nothing wonderful since his arrival from England until Saturday last when he made things warm for the best of the sprinters.

Major Taylor's appearance in Boston was signalized by his being outgeneraled by the Englishman and shut out of the final of the mile championship at the Revere track. In the final, America lined up against England, and the stars and stripes, borne by Tom Cooper of Detroit, went down to defeat, Gascoyne being too much for him. Anyone who thought that Gascoyne and Jenkins are tourists as far as sprint racing is concerned, got a rude shock when they saw the pair more than hold their own with the best American sprinters.

After a series of heats in which Taylor, Wilson, Cooper and Freeman won, the semi-finals were run. In the first of these the public saw what Taylor learned about match racing in Europe. Gascoyne and Taylor were in the heat, with Maya in to pace. The gun was fired, the pacemaker let out, but the pair never moved. Gascoyne was master in the trick Taylor tried to work—to get the Englishman in front. Finally Gascoyne started off at a snail's pace with Taylor on his rear. Up and down the steep banks one crawled after the other for a half mile, when Taylor took the pace. On the sixth lap Gascoyne went to the front. At the bell the greatest unpaced rider in England loosened out and Taylor, despite his mightiest efforts, was shut out. It was a beautiful piece of work, and the Englishman was deserving of the greatest credit.

Cooper and Freeman, with Downing to pace, comprised the second heat. They followed pace to the last quarter when

Freeman went up. Cooper trailed him to the bell, and won by the width of a tire.

In the final heat America was represented by Cooper, while England had Gascoyne. There was no pacemaker. Cooper got off in the lead but was outgeneraled by the Britisher, who went by on the sixth lap. Cooper was not able to again get in front, although he was but a few inches behind at the finish.

In the 25-mile open the following started: Gascoyne, Freeman, Wilson, Jenkins, Downing, Jacobson, Downey, Cadwell, Hausman, Hugh McLean, Maya, Newhouse, Dubois and Peabody of Lynn. On the last mile Jacobson was in front with Downing on his rear and Freeman, his mate, in third place. In a hot sprint Freeman won, with Newhouse second, Downing third and McLean fourth. Time 1h 3m 22 4-5s.

Kramer and McFarland will rejoin the national circuit at Washington on Wednesday. The contest is proving the closest and hardest fought all around circuit cycling has yet had. Each day some new surprise awaits the public—one day the defeat of Kramer by Fisher, the next Taylor's downfall and finally on Saturday at Revere Park Gascoyne, the Englishman, comes into prominence by defeating all the Yankee flyers. At this early stage of the game 12 men have scored points as follows according to the official figures of the N. C. A. up to and including July 21: Cooper 9; Kramer 9; Fisher 8; Gascoyne 5; Fenn 5; Taylor 5; McFarland 3; Collett 2; Freeman 1; Kimble 1; Butler 1.

Gascoyne won again, at Vallsburg, on Sunday. McFarland, Cooper and others

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failed to appear and it was said that they refused to ride for the purses offered. Gascoyne won the half-mile, beating Bedell, Stevens and Krebs. He was beaten by Fenn in a pursuit race.

Among the paced men Elkes again asserted his superiority, Saturday, by easily defeating Michael and Nelson. Manhattan beach was the scene of the contest. Nelson was evidently overworked, a condition in which he found himself a year ago and which should have taught him a lesson. The allurements of quick money getting had blurred his judgment, and in the fourth bruising race he had been called upon to ride in the week he found himself unable to prevent the runaway of both his opposing competitors. In a 40 mile race the Chicago rider was beaten by more than 3½ miles.

Even little Michael, who rode as true a race as in his palmiest days, finished the journey almost 3 miles in advance of Nelson, though he in turn was 2½ laps in the rear of Elkes when the line was crossed.

But if Elkes was the winner Michael was the idol of the contest. A gain of a lap by Elkes failed to evoke more than scattered applause, but a change in pace by Michael aroused the assemblage of 8,000 spectators to the highest point of enthusiasm.

A competition record for amateurs was also smashed when Walter Smith in a motor paced match at one mile with P. G. Van Cott covered the distance in 1m. 44.4-5s. This lowers the American amateur figures of 1m. 49.3-5s., held by Ray Duer, of Buffalo. Smith defeated Van Cott by 40 yards in the mile, and in a second heat at 3 miles won by 60 yards, in the fast time of 5m. 24-5s.

Gibson Beate atn Salt Lake

Salt Lake, July 17.—W. B. Vaughn, of San Diego, Cal., defeated Harry Gibson, of Cincinnati, in a 15-mile motor paced race last evening before an enthusiastic crowd of over 5,000 people. The race was the greatest ever seen on the famous track and the time, 26:56 3-5, will give some idea of the speed maintained throughout the race.

Vaughn won the choice of positions and taking the pole set a killing pace. In the fifth mile Gibson attempted to go around and the sprint proved fatal to him. For three laps the motors and followers rode neck and neck at terrific speed, when the strain on Gibson, on the upper side of the bank began to tell, causing him to lose the pace. Vaughn gained four laps before Gibson's pace-makers again picked him up and held the distance to the finish.

The three-quarter mile professional was won by King, Green second, Samuelson third and Gus Lawson fourth; time, 1:26 3-5. The mile amateur handicap was won by Eddie Smith, Hume second, Clayton third; time, 2:00 3-5.

Bauge Breaks all Road Records

On July 5 Bauge, paced by a huge vehicle, broke the 50 and 100 kilometers and 100 mile road records near Paris. He rode 50 kilometers in 53:36; former record 1:02:12 3-5; 100 kilometers in 1:48:51; former record 2:12:25; 100 miles in 3:07:45; former record 3:51:08. After the 70th kilometer Bauge ran into a farmer's wagon, and remained unconscious on the ground for 4 minutes. On being revived he continued and broke his own former record by 47 minutes.

With a system felled with malaria, contracted during a South American tour, Edouard Taylore, a noted French middle distance cyclist, was in no form to meet a well trained rider like Robert Walthour, which he did in Madison Square Garden Monday night. In a 15-mile race with motor pacing Walthour gained more than a lap in every mile and won by 18½ laps.

Terre Haute will have a race meet with events on track and road, on Sunday, August 4. Prizes worth \$650 will be given. Entry blanks may be obtained of Harry Sachs, Terre Haute, Ind.

At Salt Lake City, on the 19th, Charles Turville of Philadelphia, paced by a motor, broke the world's record for one mile, going the distance in 1:31 2-5. The previous record of 1:31 4-5 was made by John Nelson at Los Angeles.

On Sunday Will H. Brown finished a

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new record for the 480 miles between New York and Buffalo, covering the distance in 43:54:00. The former record was held by Letter Carrier Smith of New York, who rode over the course in 1893 in 56:10:00.

J. W. Bentley and his wife, of Denver, are touring from that city to Buffalo on a motor tandem. They have covered, in all, 6,700 miles on the machine. They passed through St. Louis on Thursday last.

On July 7, the amateur championship, short distance, was run in Paris. Sanz won the 1,000 meters without much difficulty in 2:08 4-5 by three lengths from Cayron and Terrier.

Poor Miller continues unlucky: At Metz, on July 7, when he had only second raters as competitors, his tandem went wrong and he was defeated by four laps by Moeder, who also won the scratch race.

FOR THE CHAMPIONSHIP OF THE WORLD

The first of the three meetings for the world's championship took place on the Friedenau track, Berlin, on July 7, amidst a course of about 12,000 people, one of the largest crowds of a first day world's championship meeting. There were three big events, the heats of the professional championship, the 100 kilometers professional championship and the tandem race, which may be considered a championship, owing to the strength of the teams.



There were but six starters in the long distance event, Bouhours, of France; Dickentmann, of Holland, and Robl, Ryser, Heiny and Krause, all Germans. From the start the speed was fast and the German hour record holder, Robl, took the lead. Before the second lap was finished Dickentmann's rear tire exploded, causing him and his tandem mates to fall. Robl also became somewhat excited and Bouhours slipped ahead, but his pacemakers went too fast and he was soon 10 meters behind. This gave Robl an opportunity to again take the lead. Just at the end of the 10th kilometer, covered in the fast time of 2:53 4-5, Bouhours, making an effort to overtake Robl, touched his tandem and was thrown, remaining unconscious, while his pacing crew went down about as quickly. The Frenchman was badly hurt and had to be taken to a hospital. Interest in the race was now almost gone, as the Dutch champion had trouble with his pacing machine at every fifth or sixth lap. Finally Robl crossed the tape a winner

c—

by 11 laps in 1:38:06, having covered 63 kilometers 76 meters during the hour.



The tandem race followed. In the first heat Huber-Seidl won without much difficulty by 30 meters from Meyer-Heering and Bourotte-Ferrari. In the second Ellegaard-Arend defeated Keaser-Kudela and Eros-Dei by 10 lengths, while in the last heat Jacquelin-Grogna won from Albrecht-Heller and Dirheimer-Schilling. However, the two other teams protested and the winners were disqualified on account of having passed inside. The final was but a match between Seidl-Huber and Ellegaard-Arend. The last lap was a neck-and-neck contest of the prettiest kind and finally Ellegaard-Arend won by half a wheel.

The eight heats of the championship were run over 1,000 meters and the winners were Jacquelin, Grogna, Arend, Seidl, Ellegaard, Keaser, Rutt, Schilling, or three German, one Austrian, one Frenchman, one Belgian, one Dane and one Dutchman. Huber and Ferrari were among the defeated.



The second meeting took place the 11th. The first event was the consolation race for the pro championship. Bourotte, Heller, Huber and Dirheimer won the four heats, while the final was taken by Huber by a few inches only from Bourotte. In the foreigner's prize Seidl, Schilling and Ellegaard lined up. The Dane and the Austrian fought it out during the entire last lap, neck to neck, and Ellegaard finally succeeded in gain-

ing a half wheel and crossed the tape a winner by that distance.

Eleven heats were necessary to arrive at the qualified riders in the amateur short distance championship. The victors were five Germans, two Frenchmen, one American, one Dane, one Austrian and one Italian.



But the capital event of the meeting was the 100 kilometers amateur championship. Seven competitors, four being German and three French, started. Most of them had poor pacing service. Guichard, a young Frenchman, soon lapped everybody. At 10 kilometers, covered in 10:10, the leader's tandem had a sudden stop and he had lost a full lap.

Salzmann succeeded, after a chase of 7 kilometers, in gaining the lead, which completely discouraged the little Frenchman, who was but 17 years old. However, it was soon the German's turn to have trouble, and one after the other three of his pacing machines went wrong, causing him to lose a lap and a half, and giving little Guichard some hope of still coming to the front. Soon after the hour, during which time Salzmann had covered 57 kilometers 900 meters, the Frenchman weakened and lost his pace. Shortly after he gave up the contest. The surprise of the day came during the last 25 kilometers, when Sievers, a German lad, not quite 16, who was going with much head as well as speed, began to pass all of his rivals. Although he was three laps to the bad at the time, he made up lap after lap, finally passing Salzmann and gaining one lap, just as the starter fired the gun announcing the end of the race. Sievers covered the distance in 1:44:39, one lap ahead of Salzmann and 16 over Gornemann, all German.



Further details about the first meeting say that before the meeting started 32 cycling clubs, comprising from 1,000 to 1,200 members, paraded around the track in groups of 20 to 50, four in a line, each group being preceded by a banner and a cyclist with a horn.



International Cyclists Union Meeting

The annual meeting of the International Cyclists' Union took place at Ber-

lin after the first day of the world's championship meeting. The following countries were represented, and had the following number of votes: Belgium 4, Switzerland 2, France 6, Denmark 2, United States 6, Italy 6, Portugal 2, Holland 2, New Zealand 2, and Germany 6. The principal decisions were that the next meeting would be held in Paris at Easter, and that the championships for 1902 will be run in Italy, as the United States had retracted its demand for that year, but had made application for 1903. The Union Velocipedic of Argentina was elected and given two votes. The withdrawal of the U. S. F. S. A., the French amateur league, was accepted, and its two votes given to the U. V. F. of France. A proposition of the United States that all races should be given flying start was rejected. A proposition by France that the championship meetings be closed to those riders who are not sent by their leagues or respective unions was laid aside for further consideration. It was decided that after January 1, 1902, the rear men on tandems, for paced races must pedal. Victor Breyer had a resolution adopted that all tandems, serving for pacing, in whatever land it may be, must be of the same dimensions. America proposed that out of 20 per cent of the profits of the championships, one-tenth be given to the I. C. U. and nine-tenth to the unions belonging to it.



Too Hot in Jamaica

New York, July 22.—George H. Wales, of Wales Brothers, Kingston, Jamaica, a subscriber to the Age since it commenced publication, called at the New York office of this paper to-day. In connection with his carriage and building material business he handles bicycles. Since 1897 he has sold about 300.

"Although the roads are fine the cycle business in Jamaica," said he, "is dead. The climate is really too hot for riding and the people are too poor to buy bicycles, that is to pay cash for them; for now the prices will not admit of \$25 down and \$5 a month as formerly and few can pay \$40 down. The installment plan is too risky to admit of doing busi-

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ness under it. We have had a few automobiles brought by winter visitors, but none by our own people."



Dunlop's Name to be Protected

Following up a recent decision of the U. S. circuit court of the western district of Pennsylvania, restraining the Pennsylvania Rubber Co. from using the word Dunlop in connection with its inner tubes or any other part of its tires, the American Dunlop Tire Co. gives formal notice that it will proceed against anyone making or using any form of alleged Dunlop tires or parts of tires. The company says that it has received many complaints of the inferior quality of tubes alleged to be Dunlops but which were not made by the Dunlop company. The tubes which caused the trouble were described as of the "Dunlop style." The Pennsylvania company will continue the manufacture of the tubes, but under another name.



The following have lately opened repair shops: A. A. North, Canton, N. Y.; William H. Kline, Lyons, N. Y.; Slover Brothers, Alvin, Tex.; H. A. Bottomly, Homer, Idaho; A. Bourassa, Chicago Heights, Ill.; Jacob Kellman, 32 Main street, Chicago Heights, Ill.; S. G. Fletcher, Hicksville, O.; D. J. Hummel, Rockford, Ill.; W. Harrison, 41 Columbia street, Utica, N. Y.; W. E. Marchant and Walter Christensen, Albert Lea, Minn.; Whitney Stratton, Big Bend, Wis.; Nelson Van Winkle, Plainfield, N. J.; Kearn & Powers, sales and repairs, Adams,

Mass.; Rigel Bros. & Co., Bay City, Mich.; Glenn Kennety, Shakopee, Minn.; Frank Drake, Mason, Mich.; Fred Perry, Ludlow, Vt.; Albert Justice, Mulhall, Ok.; R. A. Cross, Gibson City, Ill.

The entire stock of the ancient Industrial Cycle Co., which once flourished at Springfield, Mass., and made a great many cycles, has been sold to P. A. Williams, Jr., & Co., of New York. There were over 600 machines in stock.

Transfers of cycle stores: N. W. Tarbell & Co., to A. C. Pollard, Nashua, N. H.; H. L. Traub to George Riggs, Lyons, Ia.; Musselman Bros. to H. H. Hess & Co., Wichita, Ks.

George W. Combs and August L. Schott, who have conducted the Leavenworth (Ks.) Cycle Co., have dissolved partnership. Schott will continue the business.

The Shelby plant of the American Bicycle Co. has been closed for the season, only enough men being retained to keep things in order.

Judy & Cooper have opened an automobile livery at LaFayette, Ind. They have two vehicles at present and will add two next week.

James F. Rooney has bought the cycle business of William E. Furniss, of Cambridge, Mass., and will continue it on the same lines.

Gus Sheppard, an old repair man and Richard Streed, of Moline, Ill., have bought out the business of Moses Ross.

Ross Ball has bought the cycle business of Ball Bros., of Bushnell, Ill.



INFORMATION FOR BUYERS

Dayton, O., July 11.—The burner question is a burning question of great interest. The device here described and illustrated is the Dayton burner and its accessories, manufactured by the Dayton Motor Vehicle Co., of Dayton, O., and which is claimed to possess advantages not found in others. Fig. 1 shows the complete outfit, consisting of the rim, burner, generator and automatic regulator. The rim is the first novel and valuable feature of the combination. It is a single casting, faced off top and bottom and provided with packing grooves for receiving asbestos packing to insure air tight connections and exclude air from the combustion chambers, except such as enters through the air opening in the burner. The great practical importance of this feature is apparent to all who have had any experience in generating steam. This rim is fastened permanently to the boiler by screws.

The burner is a single casting properly cored, and is fastened to the rim by wing nuts, so that it can be quickly detached for cleaning the surface when necessary.

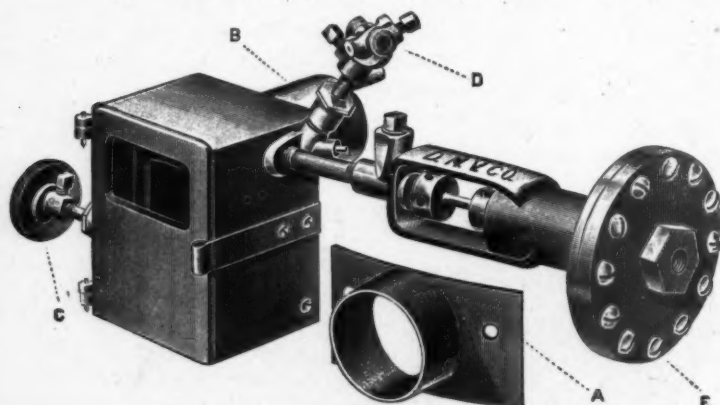


Figure 2.

The interior of the burner is cleaned through openings on the edge by removing the plugs. The air openings, instead of being made of tubes, are bored through

solid iron, and the orifices for the passage of gas, instead of being made of pin holes, are narrow annular openings, which produce solid and continuous blue flames surrounding each air tube, completely enveloping the columns of air and securing splendid combustion. It is claimed by the manufacturers that this burner cannot warp, get out of shape or leak, and is free from deterioration from



Figure 1.

rust or scale. The especially novel feature in this burner is the shape of the gas passages. Perhaps the feature of greatest general interest is the pilot house and its accessories shown in

Fig. 2, which will be sold separately if desired, and can be attached to other burners. The segment and sleeve A is attached to the rim or the boiler, as the case may be, and receives the tube B, which contains the gen-

erating or vaporizing coil, thus adjustably connecting the pilot house and contents to the burner.

The pilot house is a box shaped brass

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casting provided with a hinged door having a good-sized mica-covered peep-hole, which renders its contents visible and accessible, and, at the same time, protects them from wind. The fire is lighted by touching a match to the liquid gasoline in a small drip cup in the bottom of the pilot house, filled by slightly opening the pin valve C. The blaze lights the pilot light, which never goes out until put out by closing the valve C. In a few minutes sufficient gas is generated to admit of lighting the main fire by opening the valve D, which is operated from the driver's seat. The main fire is controlled by this one valve, and may be turned out or on at will, as the pilot light burns constantly and dispenses with torch and firepot.

The automatic gasoline regulator E, is carefully adjusted to the desired boiler pressure, and automatically regulates the fire to maintain that pressure. This regulator, which controls the fire under the boiler, by regulating the flow of gas between the generator and the burner, consists of a needle-valve, controlled by a coil spring, and a steam actuated diaphragm. The coil spring is adjusted to the desired boiler pressure, and until that is exceeded, holds the needle valve open. As soon as the boiler pressure exceeds the desired point, the steam, acting upon the diaphragm, overcomes the coil spring and closes the needle valve. A feature of importance is that the head E, containing the diaphragm, is removable from the body of the regulator without disturbing the small screws of diaphragm so that the needle or plunger can be made any length to suit various styles of burners.

Business in the West

New York, July 22.—"People are mistaken in supposing that the interest in automobile manufacture is so largely confined to the east," said Mr. Lurie, of the Auto Supply Co. "We have advertised in motor papers both east and west and fully 65 per cent of our correspondence comes from the west and a very considerable amount of business comes from it. There is great interest in the automobile on the Pacific coast. It is, however, too expensive to ship complete vehicles there so that several big coast

concerns are arranging to buy parts and import skilled mechanics from the east to assemble them."



The Blue Book System

New York, July 20.—The manifold data, which will be included in the Automobile Blue Book, is being so rapidly gathered and put into form that the publishers expect to have this handy guide for chauffeurs out by August 10. Subscriptions are coming in at a correspondingly rapid rate, showing a ready appreciation of the value of the volume. The Automobile Blue Book will be published by the Automobile Blue Book Co., 22 Burling Slip, of which Col. George Pope is president; C. H. Gillette, treasurer, and John B. Campbell, secretary. It will be in convenient pocket form, contain 300 pages and will be sold by subscription only at \$5.00.

The first edition will cover the Atlantic coast from 50 miles north of Boston south to Washington. The district extends inland 50 miles from the coast with special inland routes, such as Boston to Albany and New York to Buffalo via Albany and via the Delaware Water Gap. One hundred routes are described, giving the repair stations, hotels, distances, grades and conditions of the roads. There will be four large and four small maps accompanying the book. The large maps are of the districts of Boston, New York, Philadelphia and Baltimore and Washington and the small maps furnish the connecting links.

About 530 repair and supply stations are catalogued in the book. Contracts for the establishment of 260 of these have already been made and Secretary Campbell, who is compiling the book, says that 16 representatives are at work making these contracts and their reports are coming in at the rate of 15 per day. In the main cities there are four or five authorized stations.

The station and continuous information system is elaborate and complete. The station proprietors are under contract with blue book owners to furnish repairs at reasonable rates and there is a form of complaint with each book. There is also a telegraph code so that a tourist will find the repair man awaiting him with the needed tools and mate-

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rial on his arrival so that there may be no delay. Blue book owners will also receive monthly bulletins with addenda and valuable information. Station agents will make weekly reports.

The second edition of the blue book, covering the middle west, will probably be ready next March.

The Knox Company Incorporated

The Knox Automobile Co. has been incorporated, under Massachusetts laws, with a capital of \$60,000. The officers elected are: President, Albert E. Smith; vice-president, Harry A. Knox; treasurer, E. H. Cutler; assistant treasurer, Albert E. Smith. The above officers, with William E. Wright, Herman G. Farr, John McFethries and H. Willis Cutler of North Wilbraham, were elected directors.

Town and Country Runabout

In the natural order of events makers are striving to avoid the cart-without-a-horse appearance which characterized the early patterns of automobiles. The Electric Vehicle Co. had that in mind when it designed the Town and Country runabout, the lightest carriage it has ever built. The mechanical construction embodies several novel features of marked advantage. Although smaller than former styles of pleasure carriages, it is of substantial construction. Perfection of parts insures the greatest reliability and satisfaction. A noteworthy feature of

the vehicle, is that the total weight, including the battery, gear and body, is only 875 pounds. The battery is of the new Exide type and consists of 20 cells.

This runabout has a single motor equipment, with the controller handle as well as the steering rod on the left hand side, leaving a clear space in front of the seat. The controller gives three speeds ahead and two backward. The weight of the battery is distributed evenly on the front and rear axles. The body hangs low, making it most easy of access to the passengers, and the wheels are all of the same size. The finish of body is in black with the seat panels, shutters and gear in red. The hubs are of nickel and the trimming is in black leather. Deliveries can be made commencing October 1.

Lectures on the Motor Bicycle

It is impossible to question the fact that ever since the introduction of the motor bicycle the E. R. Thomas Motor Co. has been an ever ready, ever persistent advocate of its adoption. It has never hesitated to spend money freely when it could be done judiciously. It has been a heavy and consistent advertiser and has had a number of travelers on the road for months. In short, being convinced of the eventual success of motocycling and with absolute confidence in its machines, it has gone about its business with a firm determination to lead the procession.

For the benefit of the trade and pub-



THE TOWN AND COUNTRY RUNABOUT.

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lie, it has a notable exhibit at the Pan-American, and has kept a number of its Auto-Bis in constant use on the track in the Stadium, that the success of the motor cycle might be demonstrated to thousands and thus create a demand for the benefit of the bicycle dealers.

The latest announcement of the company cannot fail to command the admiration of all. During the Pan-American meet of the L. A. W., to be held in Buffalo from August 12 to 18, the E. R. Thomas Motor Co. will give free lectures and demonstrations at its factory, corner Broadway and Elm streets, on the use and misuse of air-cooled motors. To these lectures every bicycle rider, dealer and repair man is cordially invited. One of the rooms of the factory will be fitted up for this purpose and will be furnished with ample seating capacity.

Preliminary to the demonstrations, visitors will be shown the various tools, jigs, etc., that enter into the construction of high class motors. Following this will come the lectures and demonstrations. The lectures will really be practical talks on operation, care and repairs.

The demonstrations will, in part, accompany the talks and will include the testing as carried on by the company in its actual making of the Auto-Bi. Machines will be put out of order and in condition again. In fact, while all the details are not yet ready for publication, readers may be assured that not the least part of the program offered them at the L. A. W. meet will be the courtesies and education freely offered them by the Thomas people.

The Thomas company will do all this because the motor bicycle is destined to furnish an automobile for the masses, and all who attend the meet should avail themselves of this chance to become familiar with a machine which is gathering strength and popularity every day.

Harris Supplies Cones and Nuts

E. T. Harris, of 53 West 15th street, Chicago, has added to his plant a series of machines manufactured in his own works for the automatic production of hexagon nuts and hub cones for general trade purposes. These goods have already taken precedence in some shops,

so Mr. Harris claims. An inquiry for his adjustable cones fitted as repairs to all hubs of whatever make may prove beneficial and the hexagon nuts of this make are certainly desirable goods. Mr. Harris reports a yearly decreasing call for repairs upon his hubs, although his output is increasing.

The Merkel Motor Cycles

The Merkel Mfg. Co., Layton Park, Milwaukee, Wis., is devoting all its energy to getting out Merkel motor-cycles in quantities, the demand having increased largely since the machine was introduced. The new machine has improvements that others than Milwaukee people claim are the most practical of all the devices used for accomplishing the same results. One of these, and one which has taken a great deal of care and thought to produce, is a regulating device, operated by a small hand lever in front of the seat. Whereas, in other machines, the battery circuit is cut out by a switch on the handlebar, the exhaust valve opened at another point by hand and the spark shifted by still another lever, all three are done and done effectively by one lever in the Merkel machine. Features such as this are sure to be appreciated as soon as riders become experienced in the use of motor-cycles.

Another feature of the machine is the absence of the ordinary form of muffler. The exhaust is admitted to the lower frame tube through a hollow brace holding the motor cylinder. Then it goes to within a few inches of the crank hanger where it passes to the seat post through a short pipe provided for the purpose; then up and out through a series of small holes in the back of the seat mast, under the saddle. By the time the exhaust reaches the outlet it is almost cold, and there is little or no noise from the exhaust.

Walter Sanger rides one of these machines and is so much pleased with it that he rides wherever he wants to go and uses no other method of travel in and about Milwaukee. As Age man rode one of the cycles that had not been previously tried and was surprised at the ease of handling and the lack of noise. The

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bicycle is comparatively light, yet the frame is made of 16 gauge tubing throughout and all joints are heavily reinforced, thus insuring strength. The forks have been given particular attention and have extra heavy tubing and reinforcements.

Merkel brothers believe they have the heaviest air cooled motor on a tricycle, that has been built in America, the motor being $3\frac{1}{2}$ horsepower. The machine is made for either two persons or a single rider, and has a set of springs under the rear portion of the frame that eliminate all severe jar and jolt. This idea is certainly a good one.

Locomobile Company Raises Prices

The inevitable clamor for cheaper automobiles may receive something of a setback from the action of the Locomobile company which announces, instead of a decrease, an increase in the prices of all of its vehicles. From August 1 the prices will be as follows:

Style number 2, former price \$750, now \$850; number $2\frac{1}{2}$, \$900; number 02, formerly \$850, now \$950; number 3, formerly \$900, now \$950; numbers 003 and 0003, formerly \$1,000, now \$1,100. Styles numbers 5 and 05 remain at \$1,200 and \$1,400 respectively.

At the Mitchell Works

The Wisconsin Wheel Works, at Racine Junction, is rushed on its new motor bicycle, the Mitchell, and has about 50 machines ready to ship. The company

has shipped a number and is getting others off as soon as they can be properly assembled and expects, within the next 30 days, to have at least 150 completed and shipped.

No other machine in this country is equipped with such a powerful motor as is the Mitchell, unless it be the Orient, and this feature will gain friends.

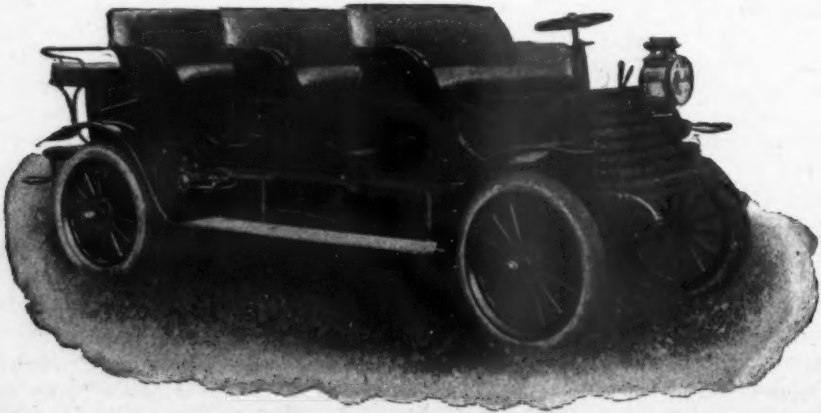
The Mitchell motor is made with a cast cylinder, but instead of being left in the rough, is turned down, each fin being turned to the exact size of the others, not only making the motor neat in appearance but allowing a high finish which aids in selling the machine.

The timing of the spark is made by a mechanism on the motor, the handle being attached to the case covering the make and break device and which does not extend to the top tube of the frame as on most of the machines now in use. The crank case is made of bronze, polished and nickel plated, the cylinder being finished in nickel also.

The drive is by means of a belt and a large pulley is used on the crank shaft.

The frame is much the same as that of the ordinary bicycle, except that it is heavier. The left grip is provided with a switch so that the battery current can be thrown in or out at will. This feature, while not new, is a good precautionary measure and oftentimes comes in handy when the operator gets into a tight corner and must bring the machine to a stop on short notice.

The cylinder oil and gasoline supply tanks are carried on the top bar of the



THE SIX SEATED GASMOBILE.



STEEL RIMS...

STEEL RIMS

Crescent and Drop
Center Patterns

Sizes— $1\frac{1}{4}$ inches up to 4
inches in section; 28
inches up to 5 feet
in diameter.

Blue Prints on Application

The Automobile and
Cycle Parts Co.

SMITH STAMPINGS
FACTORY

MILWAUKEE, WIS.

frame and sufficient oil can be carried to travel 100 miles without refilling.

The company is well pleased with the way the season has opened and looks forward to a large increase as time goes on.

Among the batteries which the Hydra Double Battery Co., of 32 Broadway, New York, has placed on the market are several which are intended for the automobile trade. One measures only 3 inches wide by $7\frac{1}{2}$ inches high, and 13 inches long, has an amperage of 30 and a voltage of $6\frac{1}{4}$. Another is 3 inches wide, $5\frac{1}{2}$ inches high and 13 inches long, has an amperage of 20 and voltage of $6\frac{1}{4}$. The company also makes a special battery for motor cycles. This is $2\frac{1}{4}$ inches wide, $4\frac{1}{2}$ inches high, and 10 inches long, showing 15 amperes, and $6\frac{1}{4}$ volts.

A. L. Dyke, of St. Louis, will issue next week new printed matter in the way of a hanger, showing almost his entire line. This hanger will be sent, together with a new circular on supplies, to any one send-

ing a 2 cent stamp. Dyke's printed matter is generally interesting.

The United States Mobile & Power Co., of Worcester, Mass., was working on 20 wagons when an Age man called there recently. They were in various stages of completion. Walter E. Taft, secretary and general manager of the company, stated that he has a number of orders ahead, and looks forward to an exceedingly busy season.

The Billings & Spencer Co. has added to the automobile forgings which it carries in stock a front axle end suitable for carriages weighing from 600 to 1,500 pounds and designed for $1\frac{1}{4}$ inch tubing. The firm also carries two styles of steering knuckles, one for $1\frac{1}{4}$ inch and the other for $1\frac{1}{2}$ inch tubing.

Matters are progressing nicely at the temporary plant of the Remington company, at Utica, N. Y. The first vehicle, made entirely there, has been turned out and given a satisfactory trial. The shipment of launch motors has commenced. The company has received orders for 30 vehicles since the removal.



IN THE WORLD OF INVENTION



Letters patent No. 678,372, dated July 16, 1901; to A. F. Blagdon-Richards, of Swansea, England.

The invention consists of a new form of saddle spring suitable for use on cycles of all kinds and has for its object the minimizing of the jolting caused when a machine is traveling over rough or uneven ground. The spring is fixed to the saddle support or that part of the machine to which the saddle, which may have its own special springs, is usually attached. It can, however, be fixed to any horizontal bar parallel to the length of the saddle, and is provided according to patent specifications with two methods: one being by one clamp only, the other by one clamp for each end of spring. The latter necessitates a rear projection of the seat post, whereas the single clamp may be used on the posts as now provided and appears to be preferable.



Head's Reversible Driving Gear

No. 678,486, dated July 16, 1901, to Reuben M. Head, of Allegheny, Pa.

The mechanism covered by this patent is a somewhat complicated affair, the idea being to provide a changeable gear for cycles of either the chain or bevel gear driven pattern, and other vehicles. It consists of a shaft, hollow shaft, a pinion on the latter, a planet gear and internal gear on the driving sprocket or bevel gear. When driving forward, the whole mechanism acts as one and the sprocket revolves with the crank axle, but when the crank axle is reversed as in back pedaling, the solid axle, by means of a stud, working in a short spiral slot in the hollow shaft, throws a clutch out of gear and allows the power to be greatly increased for the purpose of back

pedaling, the power then being transmitted through the pinion on the hollow shaft, planet and internal gear to the sprocket. If only half the reversible distance of travel allowed the cranks is used, the clutch and gearing are both thrown out, and the machine is allowed to coast.

Of the numerous drawings three are shown herewith.



Savale's Automatic Clutch

No. 678,520, dated July 16, 1901; to Louis S. Savale, of Patterson, N. J.

This mechanical device can be used, according to the inventor, on any of the forms of compensating gears now in use although from the construction, as given in the specifications, slight additions in the way of lugs would have to be provided on one side of the gear casing. The mechanism is a comparatively simple device for throwing the chain wheel out of gear so it revolves freely, while the compensating gear remains stationary. The objects are, first to provide a clutch device which will automatically stop the vehicle when the rider gets off the seat or when he is thrown off in case of accident, which will prevent the running away of the vehicle and its possible destruction, and, second, to enable the rider to stop the vehicle without stopping the engine or motor. The mechanism is illustrated in the accompanying drawings, which show a lever attachment operated by a section of the seat and which is connected to the sprocket by the device shown, which, when the seat is forced down, throws the sprocket into mesh with the lugs on the compensating gear drum. When the seat is not weighted down by the occupant of the vehicle, the clutch is automatically thrown out by

Automobile Chains

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Accuracy
Tensile
Strength
Uniformity
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Finish**

**Note the size of
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Steel Rivets.
They are not
offered by others.
Write for Prices.**



No. 153— $\frac{3}{4}$ inch Pitch, 15-16 Rollers. Hard Nickel Steel Rivets, .220 diameter.



No. 165—1 inch Pitch, 15-16 Rollers. Hard Nickel Steel Rivets, .220 diameter.



No. 155—1 inch Pitch, 9-16 Rollers. Hard Nickel Steel Rivets, .265 diameter.



No. 151— $1\frac{1}{4}$ inch Pitch, $\frac{5}{8}$ Rollers. Hard Nickel Steel Rivets, .281 diameter.



No. 157— $1\frac{3}{4}$ inch Pitch, $\frac{3}{4}$ Rollers. Hard Nickel Steel Rivets, .375 diameter.

The Automobile and Cycle Parts Co.

Diamond Chain Factory, Indianapolis, Ind.

WORLD OF INVENTIONS.

a spring provided for the purpose and the engine allowed to run free.

The chain line would be shifted by such mechanism, however, and this feature might prove a disadvantage, especially where chain is short. In the long chain the movement of the sprocket would be of lesser moment and would not be a material disadvantage.

✻

Kelley Coaster and Brake

No. 678,572, dated July 16, 1901, to Edward F. Kelley, of South Norwalk, Conn.

This device consists of a set of pauls which lie in what is termed the inner ring surrounding the hub shell, and are forced outward from their place of attachment by springs, each paul dropping into a recess provided for the purpose on the inner surface of the rear sprocket wheel. When driving forward the pauls

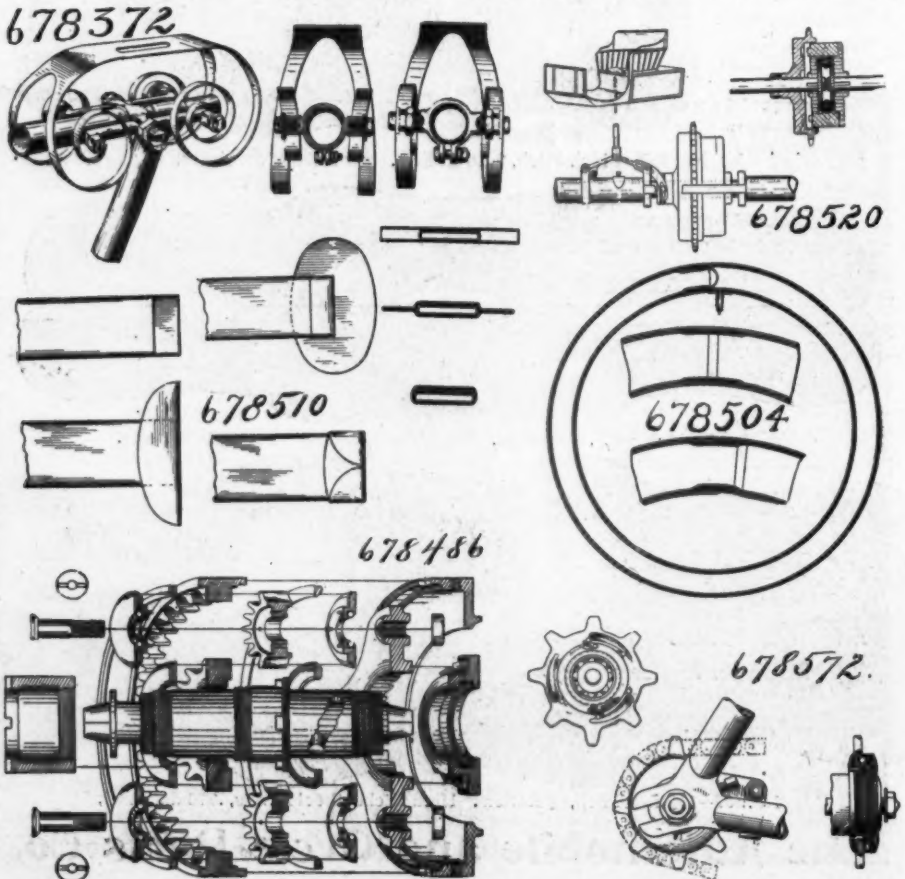
strike against the abrupt faces of the recesses above mentioned and thereby drive the rear wheel with the sprocket. When the wheel is allowed to coast, the pauls, traveling faster than the recesses, slip in and out again, doing no work. When the pedaling is reversed, three balls, which are carried in unison, in an equalizing ring, travel up three inclined surfaces, on the inner surface of what is termed an intermediate ring and thereby force the sprocket wheel, against which they bear, and the intermediate ring in opposite directions and against friction surfaces which act as effective brakes.

✻

Moomy's Inner Tube Joint

No. 678,504, dated July 16, 1901; to Joseph G. Moomy, of Erie, Pa.

The invention provides a method for vulcanizing the two ends of an inner tube



together so that air bubbles cannot form between the layers of rubber and thereby lay the construction open to future rupture or leakage. It consists of a thimble or short tube made preferably of caoutchouc, a non-vulcanizing material, into and over which the ends of the inner tube are placed, then vulcanized. It is applicable to either removable inner tube, or single tube tires.

To Strengthen Single Tubes

No. 678,510, dated July 16, 1901; to Charles G. Page, of Oak Park, Ill.

The invention consists of a method whereby removable inner tubes may be reinforced at the ends at time of manufacture or in repair shop, by an extra piece of pure rubber, the object being to close and reinforce the tube in a way to oppose lateral spread at its corner portions; to permit a tube of cheap or compounded rubber to be closed by an elastic binding of high-grade rubber adapted to resist

rupture when the tube is inflated; to permit the tube, when so desired, to be closed and vulcanized on a mandrel, and to provide a practical and effective way of closing the ends of the tubes by caps without involving the objectionable features of employing molded end caps.

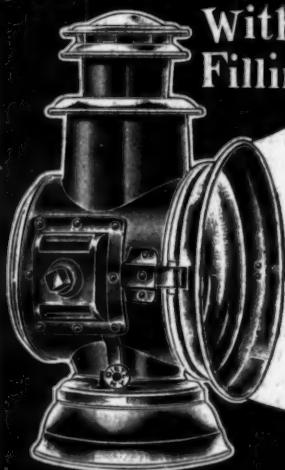
This is accomplished by cutting away a half section of the tube end and lapping the projecting end over on the tube; then cementing a circular sheet of rubber to the end and sides of the tube, the top ends of the circular piece afterwards being cemented together and folded down over the sides, being securely cemented or vulcanized in place.

This method makes a heavily butt-ended tube with little liability to blow out as the heavy ends reinforce one another where the tube is the right length for the casing. Even when they overlap their strength is sufficient to prevent trouble from blowing out. The invention appears to be practical and valuable.

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Burns Kerosene, 24 Hours

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AUTOMOBILE

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Should Have the following qualities:

- 1st. It should be built strongly enough to stand the vibration and jar of the machine and road.
 - 2nd. It should give a good light, so as to light up the road thoroughly.
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 - 5th. It should consume something which can be easily obtained anywhere.
- possesses all of these qualities. The best way to prove (or disprove) this statement is to try it.

THE DIETZ LAMP

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R.E. DIETZ COMPANY

37

Laight St., NEW YORK.



FROM THE FOUR WINDS



New York, July 22.—Nearly 40 members attended the special meeting of the A. C. A. last Wednesday to act upon various amendments. The treasurer was made an ex-officio member of the board instead of the secretary who is to be employed at a salary to be fixed by the governors. Members delinquent in dues now forfeit club privileges in 60 days instead of 90 days. The date of the annual meeting was changed to the third Monday in November.

Four or five new members were elected, prominent among whom was Robert Shaw, of Chicago.

After adjournment another meeting was held and the proposed association of clubs was discussed. It was decided to appoint a special committee to consist of the president, first vice president, the three members of the law committee and two members at large yet to be appointed by the president. The committee will formulate a plan for affiliation, which will be political and not social. The idea is to have a powerful federation to influence state and national legislation in the direction of uniformity and justice to the automobile sport and industry, and further the cause of good roads.



Collegiate Tourists and Mapmakers

Delegates from the Automobile Clubs of Columbia and Yale Universities will start Thursday, July 25, for the Berkshire Hills, in Connecticut, for the purpose of compiling an inter-collegiate road map of the Berkshires. Many college automobilists and their friends are desirous of taking the journey through the picturesque Berkshire hills, but some have hesitated on account of not knowing the condition of the roads and facilities for repairing and charging their ma-

chines. These delegates will settle the matter to the satisfaction of all concerned.

Columbia will be represented by Acting President W. B. Shoemaker and Treasurer C. A. Dana, while Yale will have as its representatives E. L. Fox and R. E. D. Easton, Jr.

If the tour proves successful, other interesting districts in the eastern states will be traversed. There is an idea of publishing an intercollegiate road map, with repair shops, gasoline stores, and hotels, marked at convenient distances.



Motor Age Artist Injured

On Thursday evening of last week Fred B. Hart, of the staff of Motor Age, met with an accident from which it was at first feared he would not recover. He was proceeding westward on Warren avenue on a motor bicycle and slacked up to let a street car pass. Behind it came another, a somewhat unusual occurrence. Hart, while crossing the track, was struck and thrown several feet. He suffered a fracture of the skull as well as a number of more or less serious bruises, none of which, happily, are of such nature as to complicate the more serious injury.

The injured man was unconscious for about 14 hours. He was then able to state, that he did not see the second car coming and had no warning of its approach until it struck him. All sorts of fool stories have been circulated as to the alleged failure of the bicycle motor to work. Every part has been blamed, from the motor to "the steering gear," which, one paper gravely asserts, "had never before failed to answer promptly." There is no reason to believe that the machine was at fault. The facts, as stated by Hart himself,

FROM THE FOUR WINDS.

seem to be that he started across the track without noticing the car. Before he had time to realize what was happening the car was upon him.

After the second day Hart improved rapidly. On Sunday, in the absence of the nurse, he was able to get out of bed, and on Tuesday he had made such progress as to warrant the belief that he will be about in two or three weeks.

The Latest About Pennington

A reminiscence of the Pennington boom, sasy an English exchange, was to be found in the sale by auction last week of the Pennington war motor car and a number of accessories in connection with the bankruptcy of Messrs. Pennington and Baines. The sale attracted only one or two people, the marvellous car, which was said to have cost £2,000, being knocked down for £100 to Mr. Shacklock, of Wolverhampton, the former manager of the Humber works in that town.

To Carry the Public

The Paasalc (N. J.) Automobile Transportation Co. has organized with a capital stock of \$50,000. It will operate auto wagons throughout that city, charging 10 cents for a single fare.

The wagons will carry 10 persons each and run through the principal streets every 15 minutes. W. F. Gaston, Isaac W. England, William R. Ryan, John H. Kehoe and Charles E. Denholm are interested in the company.

How's Your Water Column?

An example of the necessity of proper care of the water glass of steam vehicles is furnished by an English correspondent in an account of a trip which was in all other respects delightful. He says:

"Owing to my not blowing off the water column, the gauge got silted up, and outside Uxbridge the boiler ran dry, and scorched with the water gauge three parts full. By marvellous luck we stopped just outside the workshop of a very able engineer, Mr. Hewens, who turned me up an expander, and lay on his back under the boiler expanding till the water ceased to drip in his eye, and the gauge stood at 200 pounds—and yet she leaked not.

Some of the pipe work had to be treated to a course of iron wire before the silt would shift."

Milwaukee Company May Move

A report to the effect that the Milwaukee Automobile Co. will move to Cincinnati is said by the officers to be premature. Mr. Starkweather, president of the company, says: "Overtures have been made us in that direction but aside from talking matters over with Cincinnati capitalists no steps have been taken by this company and the matter remains for further consideration."

Promoting Races at Buffalo

Buffalo is to have a big three days automobile race meet in September, following the contests under the auspices of the Pan-American. Efforts will be made to get such renowned chauffeurs as Fournier and the owner of the White Ghost, W. K. Vanderbilt, Jr. The prime mover is F. N. Peckham, a Harvard man, who is managing a local Buffalo agency and whose address is 672 Main street. Mr. Peckham will be glad to hear from all who wish to enter the contests, the programme of which will be given out in a few days. The races will take place over the mile track at picturesque Fort Erie. There will be contests for amateurs and professionals and the track will be put in splendid condition.

Makers to Meet at Buffalo

New York, July 22.—A meeting of the executive committee of the National Association of Automobile Manufacturers is called for to-morrow. The annual meeting will be called at Buffalo in September.

A Frenchman has devised what he calls a Cyclone Ventilator. Attached to the head of the motor is a shaft carrying two fans which, when in operation, force a draft on to the fins of the cylinder. They are operated by a belt running from a pulley on the shaft of the engine.

Hinsdale Smith of the Automotor Co., of Springfield, Mass., has been in New York for the past two weeks showing

FROM THE FOUR WINDS.

his Automotor. This light gasoline carriage was introduced to the public last fall at the New York show as the Meteor. Mr. Smith went to New York from Springfield accompanied by his brother in the wagon shown by him, and since his arrival has sold several of the vehicles from the sample.

Mrs. L. M. Adams, of Houston, Tex., who holds the state agency for the Mobile and whose business has been referred to in these columns on more than one occasion, has placed to her credit the formation of an automobile club at Beaumont. It will be known as the Beaumont Mobile Club, another feather in the cap of this remarkable woman.

The Chicago papers printed a ridiculous story, a few days ago, about a race to be promoted by the Chicago Automobile Club between Chicago and Buffalo. The club is not organizing a race or anything else of the kind. The story was founded on the proposed tour, commencing the last day in August, the participants in which will take nine days to go to the Pan-American city.

The American Society of Mechanical Engineers makes the sensible suggestion that the standard size of catalogue should be 6 in. by 9 in., for the purpose of enabling them to be bound in one uniform volume for reference.

Reports of fires continue to arrive with great frequency. One occurred at Boston last week, Dr. Breck being the victim. After the vehicle had been almost com-

pletely destroyed the owner held a post-mortem examination and found that one of the connections in the gasoline pipe had been improperly made and, being under 60 pounds pressure, had parted.

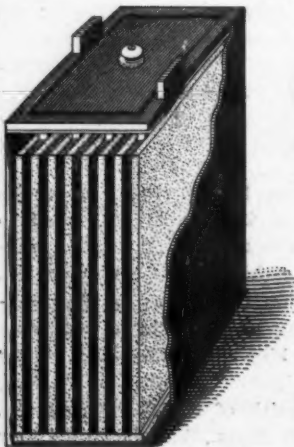
C. J. Connolly, the Rochester bicycle dealer, is driving away at the automobile business and has recently sold several vehicles. He makes a specialty of the National electric. Mr. Connolly has made seven steam carriages, is ready to do repairs and furnish supplies and recently added a charging plant. He is always in the market for supplies and would like to hear from manufacturers.

W. G. Starkweather has withdrawn from the Milwaukee Automobile Co., of which he has been treasurer and superintendent, and will take up other engineering work. He will be succeeded as superintendent by John A. Bechtel, who has purchased an interest in the company.

Mr. Tilden, of the Steel Ball Co., Chicago, who recently returned from an eastern trip, reports that he secured orders for 180,000,000 balls and that the factory is at present producing a million and a half a day.

It is reported that the Wilhelm plant, once one of the largest producers of bicycles in the country, will be devoted to the manufacture of automobiles.

The careless handling of a can of gasoline caused a fire at the Jeffery factory at Kenosha, Wis., last week. One man was



S. & T. Storage Batteries

No Electromobile is perfect without them. Greater efficiency for less weight and longer life than any other battery. :: :: :: Each section of element is surrounded by a wall of porous material, thus preventing the deterioration of plates caused by heavy charging and discharging, which is the cause of the active material becoming loose and dropping in the bottom of the Jar. :: ::

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167 Dearborn Street, Suite 411,
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All Kinds of Storage Batteries Repaired.

ADVERTISEMENTS.

badly burned but the blaze was extinguished before any great damage had been done to the property.

It is reported that Fournier and Charron expect to arrive in New York on August 10 and they will go at once to Buffalo to prepare for the automobile events at the Pan American.

The supervisors of San Francisco will be treated to a demonstration similar to that recently given before the aldermen of Chicago. They think of fixing the limit of speed at 10 miles an hour and to this the members of the local club object.

It is reported that an effort is being made to dispose of the American patent rights in the Singer motor wheel, recently described in this paper.

The address of the maker of the York gasoline motor is wanted by Charles Sefrin, 86 Van Voorhis street, Brooklyn, N. Y.

According to the English papers 90 Locomobiles had been sold in London between May 1 and July 1.

FENDERS

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Advertisements under this head 5 cents per word first insertion; 3 cents per word each insertion thereafter. Cash with order. Express orders, postoffice orders or stamps received.

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FOR SALE—The Automobile Storage and Repair Co., 57 West 66th St., New York, have new and second-hand steam, gasoline, and electric carriages constantly on hand and have always some special bargains.

FOR SALE—25 brake h. p. engine (40 h. p. ind.) 4 Cycle engine for marine or stationary purposes, fully guaranteed throughout. ACME GASOLINE ENG. CO., 726 North Vandeventer Ave., St. Louis, Mo.

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INFORMATION WANTED—The advertiser will pay \$3.00 to the first reader sending in information as to the sale of a coaster brake actuated laterally with cams and balls or rollers before the end of June 1898, and a further \$1.00 for the first paper received containing an illustration as above. Address COASTER, care Motor Age, Monon building, Chicago.

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THE CUSHION FRAME is positively the greatest bicycle invention since the advent of the pneumatic tire. It practically increases the resiliency of the tire four fold without in the least detracting from the speed or power of the wheel (as compared with the so-called rigid frame). The most enthusiastic converts to the Cushion Frame are the old-time speedy "get there" riders who at first "scoffed" the idea of COMFORT being combined with "speed and power" in a bicycle. :: :: :: ::

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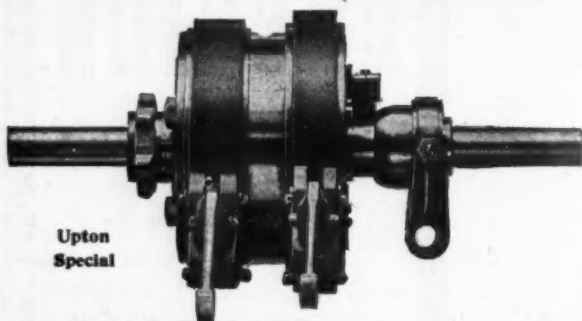
SIMPLE—Anyone can run them with safety.

PRACTICAL—Built for service, not to look at.

SPEED—As much as you want up to 40 miles per hour. Write for catalogue.

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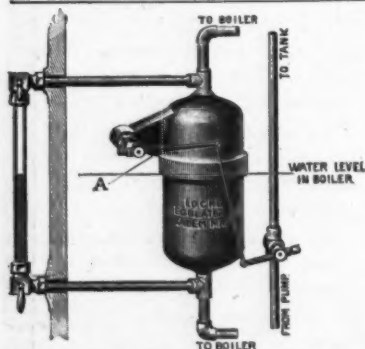
Upton
Special

Transmission Gear

TWO SPEEDS, FORWARD
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Satisfaction guaranteed
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UPTON MACHINE CO., - - 17 State Street, NEW YORK



The LOCKE Automatic Water Level Regulator

FOR STEAM VEHICLES.

No more burnt out boilers. . . Keeps water in the boiler as long as there is water in the tank. . . Relieves the anxiety of constantly watching the mirror.

—MANUFACTURED BY—

LOCKE REGULATOR CO., Salem, Mass.



They Help Your Sales and Stay Sold

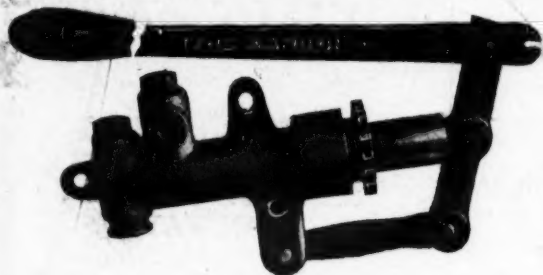
FULLY GUARANTEED. The only wheel specially designed and constructed for Automobile uses. Neither wire or wood are equal in strength. For descriptive folder address

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This the "XANDER" AUXILIARY HAND PUMP will accomplish, easily attached, fill the boiler in two (2) minutes, only pump entirely independent of feed pumps on the engine. Cheap, reliable, weighs only five (5) pounds, easily attached to any steam carriage. THE "XANDER" STEAM ENGINE, two cylinder, best on the market. Automobile parts, boilers, first-class machine work, etc. Agents wanted everywhere. Write today to

THE XANDER MACHINE & SUPPLY CO.
Reading, Penna.

Catalogue Department

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1. To save the reader the trouble and expense of writing to each individual concern whose catalogue he may need.
2. To place advertisers in direct communication with prospective purchasers.

Applicants for catalogues will please state specifically the names of the concerns whose catalogues they desire and enclose stamps to cover postage.

Applications should be addressed to the Catalogue Department, MOTOR AGE, Monon Building, Chicago.

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No { WATCHING WATER GLASS
More { BURNT-OUT BOILERS
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Automatic Electric Boiler Feed Regulator

Two dry batteries operate one year. Simple, durable, easily attached, fully guaranteed. They Never Fail

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THE RELIABLE AUTOMATIC
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and Repair parts
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Extended tour, leisurely itinerary with long stops in the Park. Private coaches for exclusive use on the drive. Pullman sleeping and dining cars. Established limit to number going. Escort of the American Tourist Association, Reau Campbell, General Manager, 1423 Marquette Building, Chicago. Colorado and Alaska tours also.

Tickets Include all Expenses Everywhere.

Train leaves Chicago via Chicago, Milwaukee & St. Paul R'y., Tuesday, July 9, 10:00 p. m.

NEW WABASH EQUIPMENT.

The Wabash Railroad has just received and placed in service on its lines running out of Chicago the following new equipment:

Eight combination baggage and passenger coaches, thirty palace day coaches, ten reclining chair cars, three cafe cars and two dining cars. The majority of these new cars are seventy feet in length, and fitted with the latest style wide vestibules. They have six-wheel trucks with steel wheels. The cars are finished in the finest selected Jago mahogany. The lighting is by Pintach gas with the exception of the cafe, dining and some of the chair cars, which are unusually well lighted by electricity, the fixtures being especially designed for these cars. The dining cars will seat twenty-nine persons and have ample kitchen space. The cafe cars will seat eighteen persons in the cafe, and have a library and smoking room in the observation end of the car which will seat fourteen persons. These cars also contain a private cafe with seating capacity for eight persons. These new cars represent the highest stage of the development of modern car building. Nothing has been omitted and no expense spared that would add to their luxurious elegance, or to the comfort and convenience of the patrons of the Wabash road.

No line is now better equipped than the Wabash for handling business to the Pan-American Exposition. Write for a copy of Pan-American folder containing a large colored map of the exposition grounds and zinc etching of the principal buildings.

F. A. PALMER,
Asst. Gen. Pass. Agt., Chicago, Ill.

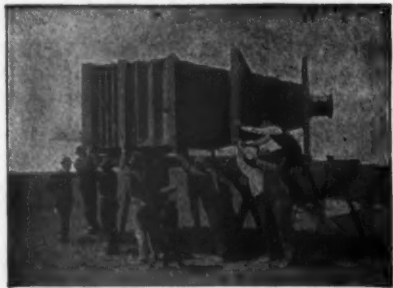
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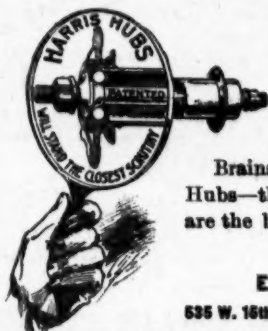
MR. A. L. DYKE, St. Louis, Mo.

DEAR SIR:—I will state for the benefit of your patrons that I have used several of your Outfits and Parts and have finished up a No. 1 Outfit with 5 H. P. for my own use. I find everything first class from the engine down. They are equal to anything I have seen in that line for simplicity, durability and ease of control. In fact the machinery and bearings are so well proportioned that there is nothing to wear out or get out of order except the tires.

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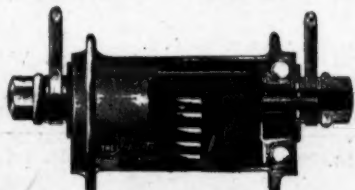
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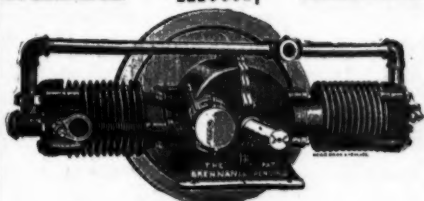
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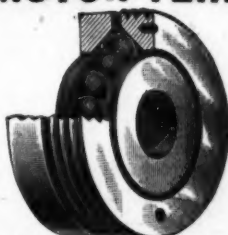
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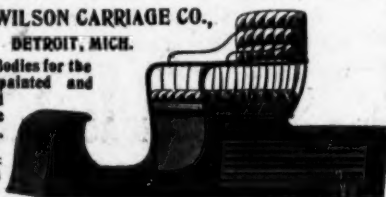
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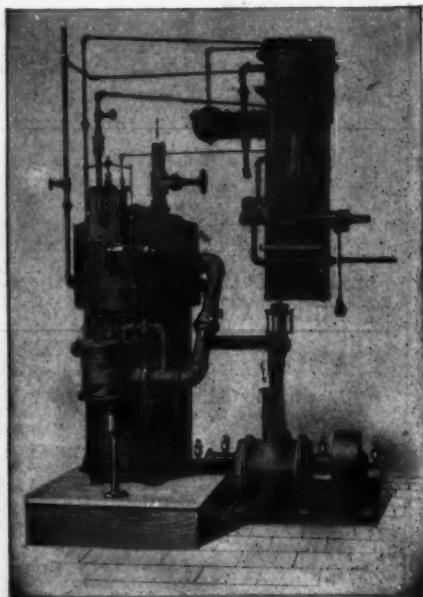


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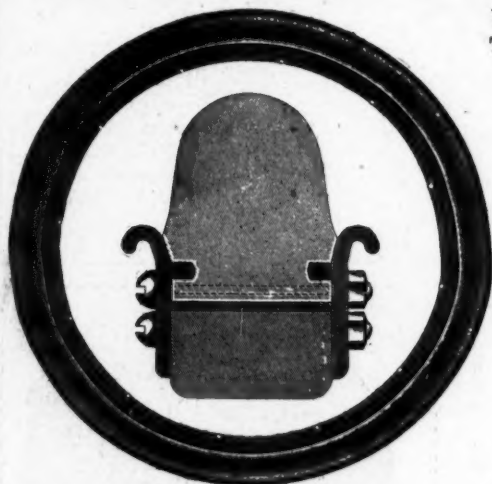
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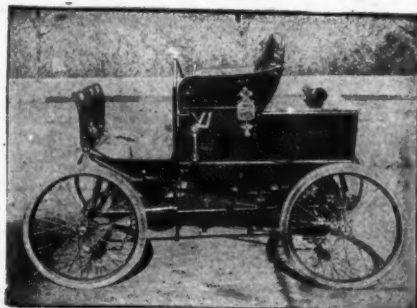
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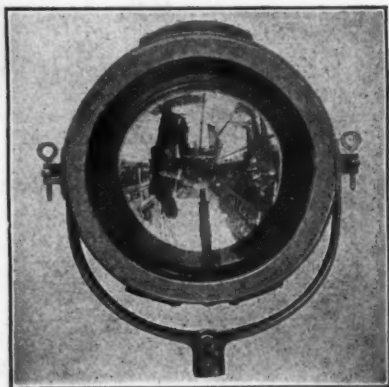
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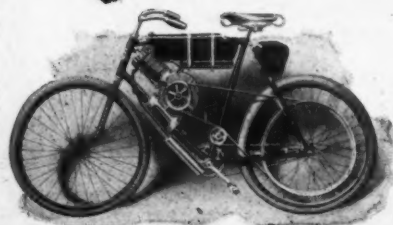
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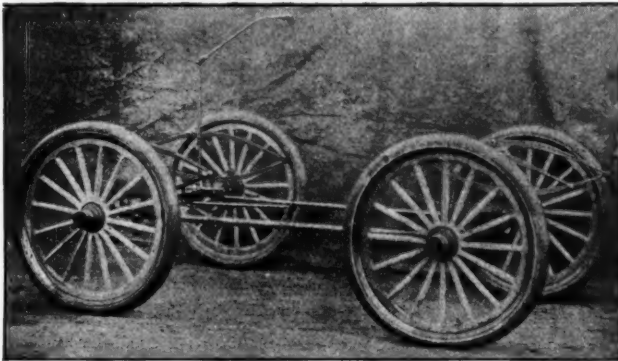


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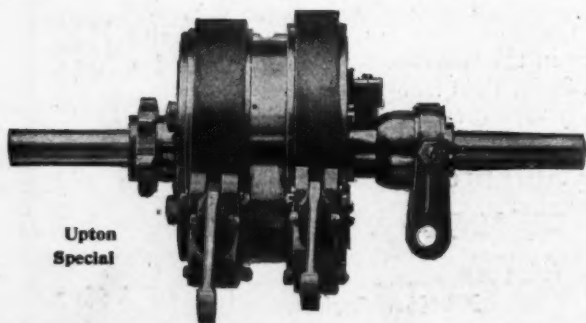
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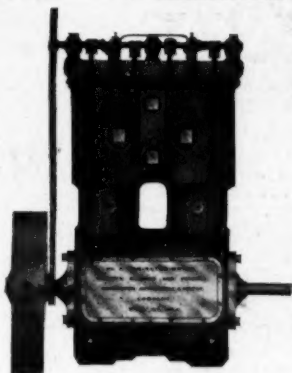
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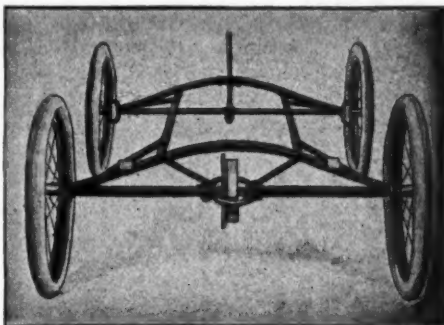
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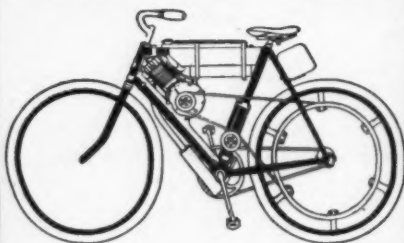
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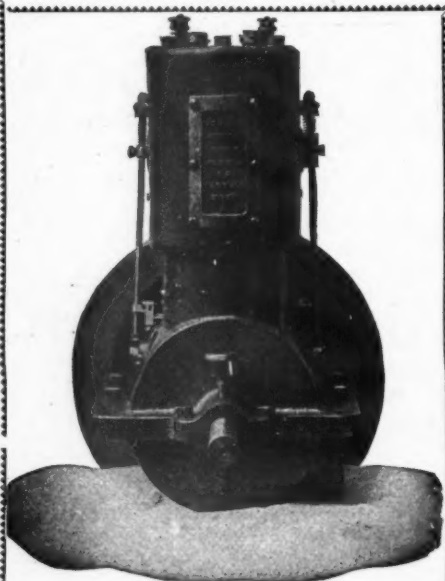
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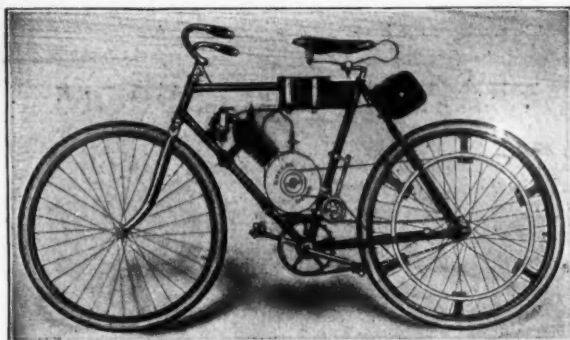
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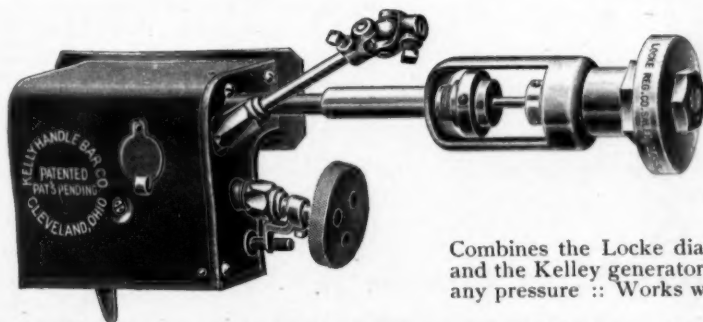
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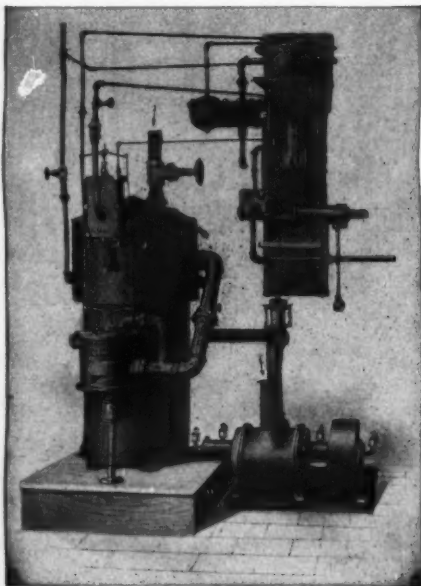
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